STRICTURE

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STRICTURE OF THE MALE URETHRA

ITS RADICAL CURE

BY

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REMARKS PREFATORY TO THE SECOND EDITION.

THE demand for a second edition of this work, within two years from the publication of the first, may well be a matter both of surprise and gratification to the author. The call for an English edition, (from Smith, Elder & Co., prominent medical publishers of London) may be accepted in proof that the interest in the alleged advances in urethral science, contained in this volume, has not been confined to this side of the Atlantic. From the fact that the views and teachings of this book, at the time of their first publication, were, in the main, opposed to the prevailing practice in cases of urethral stricture, and that, for several years before its publication, the claims of its author had been vigorously contested, in public personal discussion, and in the current medical journals, any expectation that it would meet with prompt or unqualified acceptance at the hands of the reviewers would have been unreasonable. The great questions in regard to normal urethral calibre; the definite proportionate relation between the circumference of the urethra and the organ in which it is situated; the importance of recognizing the possibility of stricture of a calibre above the then usually accepted normal standard size of the urethra; the common dependence of gleet, and often of troublesome reflex irritations, upon such strictures; the greater frequency of stricture in the anterior part of the canal; the possibility of a *radical cure of stricture by dilating urethrotomy;* the great advantages of such operation over the *dilating* procedures, both in regard to safety, comfort, time, and permanence of results; these questions were not only unsettled, but were in the midst of sharp discussion when this

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book first went to press. What was needed, for the settlement of these important issues, was *not* the criticism, favorable or otherwise, of the conventional medical critic; a large, careful, practical experience on each and every point, by capable and honest men, could alone give confidence, to the profession at large, in any decision as to the merits or demerits of the work. It has been most grateful to the author to recognize the fairness and friendliness of such notices as have appeared in the New York *Medical Record*, the London *Medical Times and Gazette*, and other excellent journals, which claimed that the positions in the work were well and fairly taken, and demanded, from every surgeon, the most careful and studious consideration. And yet the author has looked to individuals, to the leading specialists in genito-urinary matters, rather than to journalistic utterances, for permanent support to his views. He has felt confident that a fair, practical trial of them must result sooner or later in their acceptance, and ultimately in their acknowledgment, directly and frankly, or impliedly and negatively, to the profession at large. He has fully realized that, however favorable may have been the impressions produced by the published results of his experience, and that of the generous and able surgeons whose records have been incorporated with his own, yet a very considerable time would be necessary before the pronounced opinion of experts, based upon a personal experience, could be given.

When it is remembered that, before the publication of the author's views, a common standard for the size of the urethra was universally accepted and made a basis for operative procedures; that dilatation, divulsion, and division of strictures, without knowledge of the size, extent, or even of their precise locality, was the conventional and approved treatment; that all instruments required for the treatment of strictures which did not cause retention of urine, consisted of bougies and sounds of various sizes, which *in every case* were required to traverse the entire length of the urethra, regardless of the locality of the stricture; and that strictures above eight or nine of the English scale, or twenty-one of the French,

were not considered of any importance, and even the possibility of their existence authoritatively denied; and when it is also remembered that the new views required careful study into the *normal calibre* of the urethra, the *exact locality* and *degree* of stricture in every case, and that especial and expensive instruments for pursuing this mode of investigation were absolutely indispensable; when all these things are taken into account, it is certainly not to be wondered at that the older surgeons and experts, skilled in the then established plans of treatment, and ranking as authorities in such mat ters, should decline to yield *their* views and practice without a struggle. Nor need it be a matter for surprise that when finally driven into an acknowledgment of the validity of the author's positions, some should accept them without credit to the author; others, while admitting that important errors in the old procedures, had been demonstrated, and urethral science advanced in various ways, yet would claim that the author was an *extremist;* while they, being of more conservative tendencies, would commend their own views of "the author's valuable views," as safest of acceptance.

But two treatises devoting especial attention to the subject of urethral science have been issued by the medical press of this country subsequent to the publication of the first edi. tion of this work. The first of these is a fourth edition of the well-known work, "Bumstead on Venereal Diseases," greatly enlarged and brought up to November, 1879, by its editors, the late distinguished Prof. Freeman J. Bumstead and Prof. R. W. Taylor.

From the fact that Prof. Bumstead, an author long and widely distinguished for his ability, learning, and integrity, is known to have had an exceptionally large experience in the management of urethral stricture, and that he has treated very fully on this subject in the three previous editions of his work, it may be claimed that his position, in the fourth and latest edition, in regard to the great points of departure from the old school of urethral science will be of signal value to the profession.

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The following extracts from this volume show, not only that the departures referred to had been earnestly considered by Prof. Bumstead, but that he has practically admitted, and confirmed, the most important claims embodied in the present work.

1*st*. *As to the proportionate relation claimed to exist between the size of the urethra and the organ in which it is located*, Dr. Bumstead says, page 289, in speaking of the constancy of this relationship, that it "seems to have been received, generally, as *at least approximately correct*, and *hence of considerable value*." And also, pages 300 and 301, "at the time of the operation, the size of the meatus should be carefully examined, and if necessary be enlarged (by a method presently to be described) *to a size corresponding to the supposed calibre of the urethra* estimated by OTIS'S rule, already given." *

2*d*. *In regard to the urethrometer*, Prof. Bumstead says: "Since the meatus is usually the smallest part of the urethra, and varies very much in its calibre, it may not allow the introduction of any instruments thus far mentioned of sufficient size to thoroughly explore the canal, and especially to detect

* Prof. Stephen Smith, in his volume on Operative Surgery, published by Houghton, Osgood & Co., Boston. 1879, has incorporated my own statement of this matter into the text of his work on page 529, thus: "The circumference of the flaccid penis generally bears a certain relation to the capacity of the urethral canal; by taking the measurement of the former the latter can be very closely approximated before instruments are introduced." MR. BERKELEY HILL, of London, in the first of his course of lectures on Stricture of the Urethra, published in the British *Medical Journal*, November 15, 1879, says: "I am convinced that the only *exact* mode of learning the size of a given urethra consists in measuring it with the urethrometer. * * * As an useful aid in this investigation, Dr. Otis points out that the external circumference of the flaccid penis is a tolerably accurate indicator of the distensile capacity of the urethra." Mr. W. F. Teevan, in the first of his Lettsonian lectures, recently delivered at the Medical Society of London, January, 1880,† says:

"When Dr. Otis was over here, he satisfied me, by actual examination, of the general accuracy of his measurements, and of the existence of a close relationship between the circumference of the penis and the calibre of the tube it contains. He also convinced me that we had been very illogical in regarding all men as possessing the same."

† London *Lancet*, Jan. 24, 1880.

slight contractions. An instrument which could be inserted through a narrow meatus and then be dilated within the urethra, with an index at its distant extremity showing the amount of its dilatation, was therefore a desideratum. *This want has been supplied by the ingeniously contrived urethrometer of Prof. Otis.*" *

Again, Prof. B. writes, page 85, *in regard to strictures of large calibre:* "Dr. Otis has done great service by calling attention to the influence, both immediate and reflex, of strictures of large calibre, *which had generally been ignored*, and his urethrometer to determine the size of the urethra and the presence of coarctations, is a great advance in our means of diagnosis."

Again, same page, he says: "While believing with Dr. Otis that *every undoubted stricture of the urethra should be removed*, and that *without its removal no case of gleet can be permanently cured*,† I have yet seen quite a number of cases in which, after the most thorough operation for the stricture, and when no traces of the same remained, the discharge still continued for months and even years. I cannot therefore agree with him that always 'chronic urethral discharge means stricture,' nor that the removal of all strictures invariably cures gleet." The removal of the stricture is, in all cases, required, but may not be sufficient to stop the discharge.‡

In speaking of my dilating urethrotome, he terms it, page 85, "the very best devised for division of strictures of large calibre." And in regard to the great question of the possibility of the radical cure of stricture, he says at page 303: "It is, however, asserted by Otis and others, that the thorough division of strictures by internal urethrotomy effects a permanent cure, and that the canal will ever remain free, after the operation, even if nothing has been done meanwhile." Dr. Bumstead then remarks: "*I have met with a number of*

* Bumstead and Taylor, 4th ed., p. 288. † Italics my own.

‡ I have stated it as my opinion that "gleet is always due to stricture," yet I do not mean to be understood as claiming that division of stricture always cures gleet. (See this book, page 227. F. N. O.)

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cases which would seem to confirm this view, but a sufficient time has not elapsed in my own cases or in those published by others to warrant any one in expressing a decided opinion." *

In regard to the best point at which to divide a stricture, Dr. Bumstead says, p. 305: "Since there are no arguments, as far as I am aware, in favor of a downward section, I believe the above considerations should prevail and lead us to *make the section upward in the median line, in all urethrotomies posterior to the meatus and fossæ*."†

Again, in regard to division of anterior strictures he says, page 299: "Strictures within three inches of the external orifice, especially those at the meatus, *are so unyielding, and recontract so readily, that the incision becomes desirable*."

In discussing the question of urethral calibre, on page 289 (Bumstead and Taylor, 4th edition), an error has been made which puts the author of this work in a false position on an important point, and as this error is one which seems to have found considerable circulation, he desires to call the especial attention of the profession to its correction in this place. The question of urethral calibre is thus opened: "Is a normal, healthy urethra always uniform in its calibre in its spongy portion, and must every irregularity which can be detected by the urethrometer, be regarded as an evidence of disease, or are contractions in this portion of the canal, to some extent independent of disease, and consistent with health, or, in a word, normal? My own opinion," says Dr. Bumstead, "is most decidedly in favor of the latter view;" and further he says, "those who maintain to the contrary are logically forced to admit that every obstruction that can be detected by the urethrometer, even in the absence of present inconvenience, *requires internal urethrotomy for fear of some eventual ill effect*." ‡ The author would like here to state that he is not

* At pages 19 and 20, of these prefatory remarks, it will be seen that two cases are cited where over eight years have elapsed between the date of operation and the re-examination, and the patient then proven to be absolutely free from stricture.

† See note foot of page 235.

‡ All italics my own.—F. N. O.

aware of ever having claimed that strictures *which do not give rise to any inconvenience* should be subjected to treatment by internal urethrotomy or otherwise. He has heretofore claimed, and does now as positively claim, that *localized points of contraction in the spongy portion of the urethra are abnormal;* that by just so much as the urethra is contracted at any given point, it varies from the mechanical and physiological perfection which nature intended, whether the contraction be one millimeter or ten; whether the cause be an aberration in development; an inflammation, idiopathic, specific, or traumatic; but because he thus claims that localized points of contraction, often "to some extent, independent of disease and consistent with health" are *abnormal*, must he be logically forced to claim also that all shall be subjected to the operation of internal urethrotomy? Most assuredly not. A man may have a varicocele "to some extent independent of disease and consistent with health." Shall we then say that this condition is normal? In claiming this condition to be abnormal, must we *logically* commit ourselves to advising, nay, *insisting* upon operation in every case of varicocele? Exactly the same rule that has governed the author (in accordance with all conservative authority) in regard to operation for varicocele, has governed him in regard to stricture, viz., *as long as the condition occasioned no trouble, to let it alone, as far as any operative procedure is concerned;* but when it becomes troublesome, sufficiently so to warrant the risks of the operation (and they are infinitely less in anterior stricture than in varicocele), then operation may be judiciously advised and performed. In advising that a varicocele should be let alone when it gives no trouble, must we logically claim that because it is not a present source of irritation, it is a normal condition of the parts?

In pursuance of the same error (which is, inferentially, that the author has practised or advised operation when no operation was required), Dr. Bumstead (at page 309), after discussing the most serious accidents which ever follow an internal urethrotomy, says: "In view of the above considerations, the

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surgeon may well avoid internal urethrotomy unless decidedly called for, and when other means are unavailable." In other words, he would not advise operation unless he considered it advisable; for, in concluding the matter, and to bring it to a plain and practical rule of procedure, he further says: "Knowing what I do of the operation, if I had a marked and annoying stricture in the anterior portion of the urethra, or if I had an obstinate gleet which no other means would relieve, or if I were the subject of one of those tormenting neuralgias dependent upon stricture, *that we read of*,* I WOULD HAVE MY STRICTURE CUT."

"But, if I had only a 'stricture of large calibre,' presenting no obstruction to the urine, and occasioning no inconvenience, no argument drawn from possible ills in the future could persuade me to be subjected to the knife."

This makes the case so plain that the most stupid of surgeons or of patients cannot fail to understand it. If there is, *no obstruction, no inconvenience*, do not operate—do not submit to operation. The author fully concurs in this view, and will take this opportunity to assert, that he, for one, *has never operated on a case where there was no obstruction and no inconvenience, nor has he ever advised it*. "No arguments drawn from possible ills in the future" have ever determined him to operate, or to advise operation, *unless the presenting trouble was sufficient to demand it*. In every case of over seven hundred, which he has operated on, and accounts of which he has published, there has been present, one at least, and not unfrequently all the conditions in regard to which Dr. Bumstead, after most mature and deliberate consideration of the matter says, "*I would have my stricture cut*."

The strongest statement which the author can recall, which

* The form of expression "*that we read of*," used by Dr. B. in italics, intimates that he has not personally recognized such cases. M. Civiale's views on this point, cited at page 304 of this book, corresponding with a large experience of my own, are still further strengthened by Dr. Keyes in his work on venereal diseases, p. 298–9, where he says of strictures of large calibre, "These strictures may give rise to spasmodic and irritable troubles in the deep urethra, *and of the most varied nervous functional troubles in different parts of the body*."—F. N. O.

he has ever made, which would give color to the impression that he had operated, or advised operation, on account of arguments drawn from possible ills in the future, will be found on page 102 of this work, thus: "*Absolute division of all bands which in the least contract the canal is necessary for complete immunity from after trouble*." This advice is distinctly given in cases where operations were made for present good cause, such as persistent gleet, etc., etc.

Even Dr. Bumstead himself went further than this, where, in this latest edition of his work,* he says, "*believing with Dr. Otis that every undoubted stricture of the urethra should be removed, and that without its removal no case of gleet can be permanently cured*," etc., etc.

In the concluding chapter of this work two points bearing on this matter, having perhaps a tendency to mislead as to the author's claims, have been altered in the present edition. Thus, instead of saying that (Point 5, page 321) "the slightest stricture becomes worthy of consideration," the text is changed so as to read "the slightest stricture *may* become worthy of consideration." And on page 322 (Point 10), instead of saying "that stricture is, *strictly speaking*, an inflammatory product," it is altered to read "that stricture, *as a rule*, is an inflammatory product."

This is, as will be seen, admitting that contractions of the urethra may occur as a result of faulty development, what Dr. Bumstead has called *normal* contractions, or what Dr. Keyes has designated as "a physiological condition carried to excess."† The only difference between strictures or contractions of this sort and those resulting from inflammatory causes being, that they lack the cicatricial element, and hence would fail of recognition by any microscopic investigation. When sufficient in degree to cause trouble, the treatment, as has been previously stated, need not differ from that deemed appropriate for strictures arising in any other way.

The second work referred to as having been published since

* Bumstead and Taylor, page 85.

† Keyes on Venereal Diseases. Wm. Wood & Co., 1880, p. 278.

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the first issue of this book, is by Prof. Edwd. S. Keyes, a general treatise on venereal diseases; published by Wm. Wood & Co., 1880, in their subscription series of "Standard Medical Authors."

Dr. Keyes, in his two pages of preface, one of which is devoted to what he terms the "new school of urethral pathology," opens upon this school thus: "Finally, I have raised my voice, for what it may be worth, in protest against the views of the new school in urethral pathology, which seems to claim that every natural undulation, in the tissues of the pendulous urethra, is a stricture fit for cutting, and that all the ills of the genito-urinary passages may be accounted for by the existence of these undulations, and usually made to disappear when the latter are cut." He then goes on to remark: "To the honest labor and mechanical genius of the leader of this school I tender my respect. The profession is indebted to him for some capital instruments, and for a broader understanding of the tolerance and capacity of the urethra than it has yet possessed."

Now, as Dr. Keyes has thus apparently credited the author of the present volume with the leadership of the "new school in urethral pathology," he may perhaps be permitted to respond, that Dr. Keyes is quite in error as to the characteristics of this school above designated, as illustrated by its teachings and practice. What has already been said in reply to the misapprehensions of Prof. Bumstead in this matter, will answer equally for the misstatements of Dr. Keyes. *

Dr. Keyes's voice would be worth more if it was confined to its legitimate compass. No author has a right to claim a settlement of important practical points, on his own bare assertion; to contradict the results of a large and carefully tabulated experience by the citation of one or two cases. Dr. Keyes has been under eminently conservative influences during his professional career, and it is not strange that he should be slow to accept innovations. It is evident that he has not been equally slow to pronounce upon them, ap-

* Page viii, *et. seq.*

parently forgetting that arguments and assertions, however profuse, which are not directly supported by well authenticated cases, cannot stand before the inexorable logic of proven mechanical propositions; proven by the published experience of a number of men especially prominent as authorities in genito-urinary diseases, whose record for integrity and professional ability has not been impeached. Dr. Keyes begins by denying (at page 297 of his work) the truth and value of the proportionate relation between the size of the penis and the circumference of the urethra. He omits to state that this relation is admitted by such authorities as Mr. Berkeley Hill and Mr. W. F. Teevan of London, the late Prof. Bumstead of New York, Dr. Geo. A. Peters, Surgeon to New York and St. Luke's Hospitals, the late Prof. Brown of Baltimore, Prof. Pease of the Syracuse University, Dr. Mastin of Mobile, Prof. Sam'l D. Gross of Philadelphia, Prof. Geo. K. Smith of the Long Island College Hospital, and many others in this country. And then, like a man attempting to prove the fallacy and worthlessness of the science of navigation, first having thrown the compass overboard, he proceeds to show how little there is in the science of navigation. Dr. Keyes selects a case (page 297) to test the value of the views of the new school of urethral pathology. Under the direction and solicitation of the patient, for the lack of a better guide, he cuts him, and cuts him, until, as he states, "the poor fellow put his index finger into the urethra;" then, having no other guide or compass (having previously thrown the only available one overboard), he declined cutting any farther. After this he candidly remarks, "the patient shortly disappeared from view, doubtless to seek other advice." This case Dr. Keyes adduces in proof of the worthlessness of the views of "the new school of urethral pathology." Dr. Keyes, notwithstanding his opposition to the new school, adopts its claims in regard to many important points, especially in treating of that class of cases which may be said to have opened this school, and to which the author first drew the attention of the profession in 1870

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(see page 20 of this volume), and which he was the first to designate as "strictures of large calibre," in 1871 (see page 28 of this volume). Dr. Keyes devotes an entire chapter to this class of cases, without suggesting, however, that the "new school of urethral pathology" had ever been in any way identified with them. Then he says (page 295), "strictures of large calibre may be encountered anywhere from the meatus to the apex of the prostate." Again, at page 298: "Stricture of large calibre of the anterior urethra does exist when an exploring instrument, passed gently through a physiologically contracted area, draws blood (on account of an erosion or granular condition of the mucous membrane at this point), or when the physiological condition is carried to excess, as, for instance, when them eatus is contracted to the size of a knitting-needle." *

Again, in regard to symptoms of "stricture of large calibre," Dr. Keyes writes, page 299: "These strictures may give rise to spasmodic and irritable troubles in the deep urethra, symptoms of cystitis and of the most varied functional troubles in different parts of the body."

Again (page 299) he says: "The most common symptom of *stricture of large calibre* is a gleet, more or less persistent" (see page 20 of this volume.) Dr. Keyes occupies some space (page 298) in giving his opinion as to when a stricture is of sufficient importance for a surgeon to interfere, and answers in accordance with the views of Dr. Bumstead, and also of the "new school in urethral pathology" already given, viz., "never until the occurrence of symptoms calls for interference."

FIG. 30.

In regard to diagnosis he says (page 299): "The clinical diagnosis of '*stricture of large calibre*' is easy and satisfactory. A bulbous bougie (Fig. 30, † preferably of metal, as large as the meatus

* This last has not been claimed by the new school as among strictures of large calibre.—F. N. O.

† See pages 2 and 23 this volume.

will take, may be warmed and anointed with vaseline, and gently passed through the urethra. When it comes to a tight spot the surgeon can feel it as well as the patient" (see page 1, this volume). This method of procedure will doubtless be accepted by the new school in urethral pathology without debate. He then goes on to say, "If, in attempting this exploration, congenital or pathological narrowing of the orifice of the urethra exist, the canal may still be explored without cutting the meatus, by the use of the very ingenious expanding urethrometer devised by Dr. Otis, (see this volume, pages 299 and 300). Now, in regard to treatment, Dr. Keyes says, page 301: "Strictures far forward must be cut to be cured. * * * This is most conveniently done with the straight and blunt bistoury. * * * Dr. Otis advises the operator to place the index finger of his left hand along the integument, beneath the urethra, so that the stricture band may be felt between the finger and the knife. In this position he cuts directly upon the finger until he can feel the point of the knife against the soft tissues, and appreciate the absence of the band between the finger and the knife. This is an excellent method, better in many cases than any other."

Again, in regard to *treatment* of deeper strictures, he says, page 302, "The treatment most appropriate for all other organic strictures is by dilatation *at first. Should this fail, other means are at hand.*" * These other means he describes on page 305, thus: "If then internal urethrotomy has become necessary in the treatment of a stricture of large calibre, in the pendulous urethra, which of the numerous instruments for performing the operation shall be used, and to what limit in size shall the urethra be cut?" He answers thus: "I have tried nearly all the improved modern urethrotomes, and *have found none so good as the dilating urethrotome of Dr. Otis, for dealing with such strictures as are to be cut in the pendulous urethra.*" † Then, at page 307, he says: "After the cutting has been accomplished, it is well to pass a bulbous sound over the cut region to decide whether the

* Italics my own.—F. N. O.

† Italics my own.—F. N. O.

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cutting has been efficient, and has thoroughly relieved the constriction. (This certainly will not be disputed by the new school.) If this is found not to be the case, the urethrotome should not be re-introduced. * * * The way (he further says) to avoid a second cut is to make the first one deliberately, to locate it accurately, and to make it deep enough. * * * The after-treatment consists of the use of the conical steel sound at appropriate intervals." (See pages 101 and 105, this volume.) It will thus be seen that notwithstanding Dr. Keyes, in his preface, has raised his voice, for what it was worth, against "the new school in urethral pathology," he is constrained to adopt, as his own, some of the most important points which distinguish this so-called school. The good taste in such appropriation, without credit, and while assuming the position of an adversary, may be questioned.

I fully accept the distinction made by Dr. Keyes (page 297) between the so-called physiological and the inodular stricture, and that the former is much less likely to be a cause of trouble; but, when it is "carried to excess" (as Dr. K. puts it in the case of a meatus congenitally no larger than a pin hole), then it *may* give rise to as much trouble as any inodular stricture. The simple fact that the division of such a stricture leaves no traces of its existence which can be recognized by microscopic examination, does not prove that it never existed; it simply proves that the material constituting the contraction was homogeneous with the structures of the part; was, as he says, a physiological contraction, and not the result of a cicatricial deposit. The fact that such contractions occur at various points in the urethra is well recognized. This the author believes he was the first to bring to absolute demonstration, in a case quoted by Dr. Keyes, on page 297 of his work, and upon which Dr. K. relies mainly to prove that physiological contractions *do not* constitute stricture. In this case, a number of contractions were amply verified, by the author of the present work and others, on repeated occasions, before operation, by means of bulbous sounds. After division by the dilating urethrotome they

could no longer be felt, or their sites in any way recognized. This operation, as Dr. Keyes states, was complicated by the external perineal section in a man the subject of profound disease of the bladder and kidneys. Death occurred from pyelo-nephritis on the sixteenth day. Macroscopic examination of the urethra showed a dense cicatricial knot at the site of the perineal stricture, but *no trace of any stricture in the anterior portion of the canal.* The parts were subjected to a further examination with the microscope by Dr. Francis Delafield (Prof. of Path. Anat. Coll. Phys. and Surgeons), who failed to find any trace of cicatricial tissue at the points in the anterior portion of the canal, where strictures were *proven* to exist before the operation. The effort to make a difference between a *stricture* and a *contraction* (physiological or otherwise) must fail, until our language is reconstructed. Anything which *constricts* produces *stricture.* There are, as is well known, various causes of stricture, and some, under circumstances which must determine, to a certain degree, the amount and character of the trouble to which they will ultimately give rise. It is this *trouble* which calls for operative measures, without regard to the fact of whether the stricture is of inflammatory origin—idiopathic, specific, or traumatic—or whether it is the "physiological condition carried to excess."

One count which Dr. Keyes makes against the new school, etc., in his preface, is, that "its claims seem to leave out of view, that the disease for which the patient seeks relief, is only a symptom, and that such symptom may be due to a variety of causes." The answer is, that the disease which is taken into account, is the *stricture*, and that the stricture is not a symptom but a mechanical obstruction. The symptom, gleet, leads to examination for the stricture, which, when found (according to the new school in urethral pathology), is treated preferably by division, if in the pendulous urethra; by dilatation, if division is contraindicated. The contra-indication being when the stricture is not a close one, and is in the deep urethra, or when the patient will not consent to any

cutting operation, after being informed that it is the quickest, and surest, and an equally safe way of getting rid of the stricture, and the only one holding out the chance of radical cure. If, after this, the patient chooses dilatation, he can have it, and, if he continues of the same mind, stick to it as long as he lives. This differs from the old plan, inasmuch as it *proposes* immediate and permanent relief, and before the patient is worn out in mind, body, and estate by a long course of dilatation.

Dr. K. says also, in the same connection, that "a serious criticism upon the methods of the new school is that it does not generally, in its lists of published cases, give any prominence to those cases which have been cut without relief of the symptoms complained of." All the cases published by the author up to the issuing of the first edition of this work, as well as in this edition, were taken *seriatim*, as they occurred in his practice. One hundred will be found tabulated at page 106 *et seq.*, and one hundred and thirty-six more at page 323 *et sequitur*, and an abstract of the same on page 317. The results—good, bad, and indifferent—will be found distinctly stated opposite each number. In return, it would be fair to ask where Dr. Keyes has reported his successful cases, by the new methods, and where some of the tabulated unsuccessful cases treated by the old plans may be reached.

"In short" (says Dr. Keyes, in the conclusion of his preface), "the pathology and treatment of the new school are narrow, and tend to encourage routine practice in the young, to the detriment of a careful study in each case."

The breadth of the practice of the old school, before the appearance of the new, was equivalent to the breadth of the bougie; if the young practitioner could pass it skilfully, he was accepted as an expert in the treatment of stricture. The new school broke through that routine, and made the study of urethral science necessary—"*hinc illæ lachrymæ.*"

As has been previously remarked, it cannot be expected of experts, learned in the views and traditions, and skilled in the procedures of the past, that they should yield their positions as authorities in such matters without a struggle. It may, however, be claimed, that on the whole, the advances made by Dr. Keyes, in the new departure, are not inconsiderable, and it may also be reasonably expected, as it is sincerely to be hoped, that at no distant day he will be enabled to lift up his voice wholly and unmistakably in behalf of "*the new school in urethral pathology.*"

One of the most important points claimed as a result of the operation upon urethral strictures by dilating urethrotomy, is the *radical cure of stricture.* (See Point 9, of concluding chapter, page 322.) In regard to this, on page 309: sixty-seven cases are reported, where re-examinations had been made, from one month to six years and six months after the complete division of strictures, and had demonstrated complete absence of recontraction at any point. Also, at page 262, twenty cases re-examined by Prof. Pease, from six months to two years after complete division of strictures, were shown to be free from any evidence of recontraction. Dr. Bumstead's testimony, already given (page viii), in favor of radical, permanent, cure of stricture, after the operation of dilating urethrotomy, yet claims that *time sufficient has not elapsed to enable any one to speak with absolute certainty on this point.*

In answer to this it may be stated that within the present month (May, 1880), the author has examined two cases, operated on OVER EIGHT YEARS SINCE, and found complete absence of stricture in each case. The first case was the one for the division of whose strictures, especially, the dilating urethrotome was constructed, and in whom a single stricture at one and a half inches from the urethral orifice was divided, Jan. 12th, 1872. Three subsequent operations were performed on deeper strictures in this case. The last was on March 4th, 1872. The cut surfaces were kept asunder by the occasional passage of a sound, until March 11th, 1872, and no further treatment resorted to. Re-examination of the patient (Mr. A.), seven months after, showed the urethra free from every trace of stricture. An account of this case (first published Feb., 1873), will be found on page 43 of this volume.

Mr. A.'s case was again examined, by a committee of sur-

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geons, Dec., 1873 (see page 48), and at this date *not a trace of stricture* could yet be detected with No. 30, metallic bulbous sound.

The final examination in this case was made by the author, May 4th, 1880, EIGHT YEARS AND TWO MONTHS from the date of the last operation. This examination was made with the urethrometer, which was introduced closed, to the bulbo-membranous junction, and there expanded to 32F. At this size it came easily through the entire anterior portion of the canal, without pain, and without giving evidence of the slightest obstruction or lack of suppleness at any point.

The second case (case iii., this vol., page 47), J. C., operated on Jan., 1872, and again for deeper strictures in March and May of the same year. Re-examination by the author, Jan. 30, 1873, and found free from stricture. Again examined by a committee of surgeons in Dec., 1873 (page 48), with bulbous sounds 30F., and 31F., and yet no recontraction recognized at any point. Finally re-examined, May 4th, 1880, with the urethrometer dilated to 32F., demonstrating complete absence of stricture at any point, and this OVER EIGHT YEARS FROM THE DATE OF OPERATION. In view of the permanence of results in the two cases above cited—over eight years—and without the slightest evidence of any disposition to recontraction at the end of this long period, it may be now reasonably claimed that the possibility of the radical cure of stricture, through complete division, and subsequent treatment in accordance with the views and procedures set forth in this volume, *has, at last, been absolutely demonstrated.*

In addition to the above-mentioned cases, which have been subjected to a re-examination during the present month, is one operated on March 6th, 1875 (No. 15 of the second series of tabulated cases, page 327), for four strictures defined by 24F. bulb in a urethra of 36 mm. The urethrometer introduced closed to the bulbo-membranous junction was expanded to 36F. and withdrawn without the slightest pain or holding, or lack of suppleness at any point. The fact that these strictures occurred in a surgeon of some prominence in this city, and one quite ready to testify on all proper occasions to the completeness of his recovery, lends a special interest to this case. In addition to the foregoing the author has made, since the publication of the first edition of this work, twenty other re-examinations at dates varying from two months to six years after operation, and has found only three cases, in this number, where recontraction had taken place. He has also to add ninety-seven cases to the list of 635 operations, published at page 279 of this volume, five of which, first named, were combined with external perineal urethrotomy, "without a death or permanent disability of any sort."

As the result of this large personal experience in dilating urethrotomy the author desires to claim that complete division of stricture and after-treatment strictly in accordance with the plans proposed by him results in *radical cure* as a rule. Undoubtedly, exceptions may and will occur. When occurring they will probably be due either to incomplete division, faulty after-treatment, or, perhaps, in some cases most rare, when the tendency to production of inodular tissue is excessive. In some cases of recontraction after thorough operation, it is quite probable that the cicatricial material pervades the tissues to such a depth that makes complete division impossible.

A notable case of failure by dilating urethrotomy was cited in the previous edition of this work (pages 283–4), operated on for numerous close strictures, the deepest at 6½ inches, by Prof. R. W. Pease, of Syracuse, first with the instrument of M. Maisonneuve and then with the dilating urethrotome. Recontraction took place within a few months, and a second and similar operation was done in St. Luke's Hospital by Prof. Thos. T. Sabine. Epididymitis followed and prevented subsequent use of instruments to maintain the patency of the canal. In a few weeks the stricture had recontracted to a filiform size. A third operation was done by the author, making the urethra clear to 36 F. In closing the account of this case on page 284 of this vol., it is stated that, after a severe hemorrhage from the locality of the deep stricture, near the neck of the bladder, "the patient did perfectly well, and

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when re-examined by me (in St. Luke's Hospital) about a month after presented no trace of stricture."

It was subsequently stated to the author by Dr. Sabine that the strictures in this case had again recontracted. That on examination two months subsequent to the operation, a stricture at 4½ inches was found to have recontracted to below 24F.* This would then present an example of stricture recurring repeatedly, and apparently after the most thorough division by men of experience in the best modes of operating. Such cases, however explained, must be accepted as standing in most gratifying contrast with the great majority of cases properly subjected to the operation of dilating urethrotomy.† Even if recontraction did occur in this case, and should occur in other and similar cases, it shows, not that the operation of dilating urethrotomy is a failure, but furnishes a weighty argument in favor of early operation upon stricture, before the urethra is contracted to any great extent, and while the operation is almost if not wholly free from risk, and in which class of cases the radical cure of stricture may be safely promised. It is a well-known fact that in nearly, if not quite, all the accidents that have ever occurred, through operations upon urethral stricture, by any method, the operation has been done upon *close stricture*, and for the relief of *difficult micturition*, without which relief, sooner or later, a fatal issue from retention or suppression of urine must have been apprehended.

Radical cure of stricture, even in the most desperate cases, may however be possible by dilating urethrotomy, as is shown in the case reported by Dr. Eldridge, in the appendix at the close of this volume.

* Just as this matter is going to press, I learn through Dr. Sabine, that this patient claims never to have had gonorrhœa, nor any venereal exposure since the date of the last operation, June 10, 1878, and that his intention is to submit himself to another operation at an early day, on account of gradually increasing contraction.

† This case may be found among the tabulated cases of Prof. Pease as No. 6, on page 265, this vol. In reply to a letter addressed to Prof. Pease concerning this case he writes, under date of May 13, 1880, "I cannot think that either myself or Dr. Sabine can be held responsible for the result in this case, neither can the result in the last operation be questioned, as my knowledge of the patient is such as to convince me of his entire lack of self-control. No sooner would he recover from an operation than he would contract a fresh clap, indeed the man's normal condition would appear to be that of a constant specific urethritis."—F. N. O."

In general terms the author feels justified in stating, as a result of his own experience, that proper instruments properly used, and with judicious after-treatment, may be claimed to warrant assurance of the radical cure of stricture in at least nine cases out of ten so operated upon.

In this connection, and in answer to many inquiries, the author would state that he considers the short, straight dilating urethrotome, figured at page 278, as the best in all respects for all cases of stricture occurring at any point between a point in the urethra corresponding with the base of the glans and the bulbo-membranous junction. In the exceptional cases where stricture occurs beyond this point, division of stricture, by any instrument, is a grave procedure on account of liability to hemorrhage beyond easy control, and should only be decided on, with the dilating urethrotome, after the most thorough appreciation of the attendant risks of operations in the deeper parts of the urethra. My opinion in regard to this matter has already been expressed in this, as well as in the former edition, at page 310. Fortunately, the great majority of strictures requiring treatment are situated anterior to the bulb—the apparent strictures, usually referred to as being "at the neck of the bladder" are purely spasmodic, and, as a rule, disappear on removal of the anterior organic contraction.

The correctness of my position in regard to the frequent occurrence and importance of spasmodic stricture, and its dependence in a large number of cases upon a reflex irritation, (as shown page 302 *et seq.*) has been amply proven during the past year, in the course of a discussion between Prof. H. B. Sands and myself, and which may be found in the columns of the *Hospital Gazette* of Feb. 13, April 19, May 3, June 28, July 12, and July 22. And it is, in my opinion, not too much now to claim that no operations upon strictures in the deep urethra are warrantable; until all pronounced localized contractions, in the anterior urethra, have been removed. I had hoped before this time to have published the volume on reflex irritations, announced as in preparation when the first edition of this book went to press, but various considerations

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have delayed its appearance. It is proposed, however, to issue the volume during the coming summer, and its chief value will consist in its presentation of numerous well-authenticated cases of *reflex irritations* and *neuroses of the genito-urinary tract*, chief among which will appear a series of examples where spasmodic stricture of the deep urethra has been mistaken for organic stricture by the best and most experienced surgical authorities, and treated as such.

In addition to this evidence of the comparative safety of internal urethrotomy by the plans and procedures I have proposed, I am permitted to quote from a letter recently received from Dr. Stuart Eldridge, formerly Professor of Anatomy in the Georgetown Medical College, and at present Surgeon-in-Chief of the General Hospital at Yokohama, in which he reports over one hundred operations on stricture by dilating urethrotomy, according to my procedures. "Nearly one-half," says Dr. Eldridge, "were complicated with divulsions executed at the same sitting, the strictures being too small to admit your instrument, and I have not lost one." Dr. Eldridge confirms my claims of radical cure of stricture, in the most conclusive way, by publication of a case where the operation of dilating urethrotomy was performed upon a close stricture complicated with Bright's disease of the kidneys and tertiary syphilis. When the patient died, three years after, from syphilitic disease, at the *post-mortem* examination, *complete and permanent recovery from the stricture was demonstrated.* This account was published in the *New York Medical Journal* in the issue of July, 1878, with a carefully executed woodcut.

This example is considered so important as an absolute and indisputable proof of my claims in regard to the radical cure of urethral stricture, that the woodcut representing the specimen is reproduced at the close of the present volume, and the text of the case is quoted in full in the Appendix (page 353, *et sequitur*.)

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STRICTURE OF THE MALE URETHRA;

ITS RADICAL CURE.

CHAPTER I.

CHRONIC URETHRAL DISCHARGES.

THE subject of Genito-Urinary diseases, and more especially those forms of trouble known as Urethral Stricture and Gleet, have received much consideration from me for several years past. As my study and experience in these diseases have led me in a direction somewhat opposed to the views and treatment hitherto accepted by surgeons throughout the world, it appears to me desirable at this time to make a full statement of the course, progress, and results of my observations and practice.

As early as the year 1861, I had come to appreciate the fact that the ordinary elastic bougie, or any instrument of uniform diameter, might traverse a urethra without giving indication of Stricture at any point; whereas, in the same urethra, with the bougie-a-boule (of M. d'Etiolles) of the same size, Stricture was, not unfrequently, made out with absolute certainty. Soon finding the necessity for an instrument of wider range and greater endurance than the bougie-a-boule of M. d'Etiolles, (which was made of gummed cloth, and rarely found larger than 21m. of the French scale,) I devised the *bulbous sound*.

This was a simple metallic bulb of olive shape, attached to a slender copper shaft. Six of these instruments were constructed under my direction, by Hernstein & Co., Surgical Instrument Makers, of sizes from 18 mm. to 30 mm. in

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circumference, and, for convenience, screwing into a common handle.

With the aid of these bulbs I was often able to detect localized points of contraction that had escaped recognition in examination with the smaller bulbs of M. d'Etiolles. At this early period (1861) my attention was attracted to the frequent association of a chronic purulent urethral discharge

THE BULBOUS SOUND.

with localized urethral contractions of greater or less degree. The rebellious behavior of such discharges, under all then recognized modes of treatment, induced me to make this subject one of especial study for the following years and up to March, 1870, when I presented the results of my thought and experience in a paper read before the New York Medical Journal Association, and published in the N. Y. Medical Journal of June, 1870, as follows:

On Chronic Urethral Discharges.

In the term *chronic* it is intended to include, not only those purulent or muco-purulent discharges from the urethra which occur as the sequelæ of acute inflammations of the urethral mucous membrane, but all which, by their appearance and sub-acute character, resemble such discharges without regard to the time of their continuance. In consideration of the similarity between chronic urethral discharges, both as to their symptomatology and their chemical and physical constituents, and in view of their moral and social as well as the medico-legal relations, the importance of classifying such discharges in accordance with their etiology will, I trust, be admitted.

By such an arrangement, they readily separate into three distinct groups:

I.—The venereal specific.

II.—The venereal non-specific.
III.—The non-venereal.

Under the head of venereal specific we then have—

1. Gonorrhœa and its sequelæ.
2. Chancroid.
3. Syphilis.

Under that of venereal non-specific we have—

1. The menstrual fluid.
2. Vicious non-specific, vaginal, and uterine secretions.

Under that of non-venereal—

1. Acrid urinary secretions.
2. Idiopathic inflammation of the prostate.
3. Mechanical injuries and obstructions and chemical irritants.
4. Cutaneous disease.

The inclusion of gonorrhœa among the *venereal specific* causes of chronic discharge from the urethra is with entire acceptance of the fact, that no physical distinction has yet been drawn between an acute urethritis, caused by contact with gonorrhœal matter, and one set up by the application of the purulent secretion of a conjunctivitis, or of a uterine catarrh, or by excessive coitus, or, in short, by any one of the causes which are set down among the non-specific class. Yet it is well known that a peculiar virulence does pertain to the purulent secretion of a gonorrhœal urethritis; that its contact with sound mucous membrane communicates, with almost positive certainty, an inflammation whose product is of similar virulence, and whose tendency is to run a prolonged course; while from all other causes to which a urethritis may be attributed, not only is the establishment of the disease most exceptional, but, when it does so occur, it is of shorter duration, and, as a rule, of more benign character. That gonorrhœal pus has the power, more than any other, of extending its degenerating influence beyond the immediate layer of epithelium in contact with it, also seems to me certain; but, until a specific virulent principle can be found in it, we must be

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content to accept the inflammation of gonorrhœa as a *simple* inflammation of unusually acute character. Yet, in a classification based upon etiological considerations, the propriety of placing gonorrhœa among the *specific* causes of urethral discharge must, I think, be conceded.

The organisms with which we have chiefly to deal, in considering diseases of the urethra, are mucous membrane, muscular and connective tissue, with their vessels and nerves. The mucous membrane which lines the urethral canal consists, like all other mucous tissues, of an epithelial structure, lying on a basement membrane; the epithelium being of the stratified kind, and of varied character in different regions—the tessellated variety presenting in the anterior, the spheroidal and columnar in the posterior parts of the canal. Underneath the mucous membrane is a thin layer comprised of muscular fibres and connective tissue, which is united to the tendinous layer of the corpus spongiosum by delicate membranous bands.

It may be well to glance briefly over the pathological changes which are now recognized as taking place in inflammations of mucous membrane of the variety under consideration, viz., those protected by a stratified epithelium. All such in their normal condition present a lubricated surface—this lubrication due to a bland secretion from the mucous follicles.

Under the microscope, this secretion is found to consist of mucosine in which are suspended mucous corpuscles and epithelial scales. When the membrane is subjected to irritating influences, the epithelial element in the secretion is increased, the epithelial cells are hurried from the surface before they are fully developed, their forms become rounded, and hence they are more easily detached, until, as the inflammatory process progresses, the natural proliferation of epithelial structure becomes luxuriation (Virchow). Layer after layer is thrown off, less and less perfectly developed, losing more and more the characteristics of the true epithelial scale, until at length it has degenerated into the form recognized

as the pus-corpuscle, and the mucous secretion has assumed all the features of the purulent discharge.

In their normal condition, mucous membranes secrete only sufficient fluid to answer the purposes of lubrication. All discharges from the urethra are then evidences of abnormal excitement—of imperfect cell-development—varying in degree from the first stage of epithelial imperfection to complete purulent degeneration, and dependent upon exciting causes of the varied character indicated in the classification I have ventured to adopt.

In the frequency of its occurrence, in the importance of its indications, in its pathological connections, and in its moral, social, and medico-legal belongings, the discharge arising from gonorrhœa and its sequelæ ranks first in importance. We have at this time only to deal with chronic forms of disease as defined in the commencement of this article. Omitting, then, all consideration of the acute stage of gonorrhœa, I shall at once proceed to consider the conditions upon which a continuance of the chronic or subacute discharge may depend. These are as follows: 1. An enfeebled condition of that portion of the mucous lining of the urethra which has been occupied by the acute inflammation. The degeneration of epithelium set up by the acute disease is continued by *enervation*—a simple want of vitality in the tissue sufficient for a return to its normal functions. 2. The vitality apparently restored by appropriate local and general treatment; the discharge, though in decreased amount, still continues. Its continuance may depend on *the localization of the disease in the deeper parts of the urethra, or in folds of membrane, or in mucous crypts or follicles which have escaped local medication.* 3. The continuance of the discharge may be due to granular ulcerations located at any point along the canal where from any cause complete exfoliation of the epithelium has occurred. 4. From alterations in the *course* and *calibre* of the urethral tube dependent upon pathological changes occurring during recent or previous inflammations. These causes of the persistence of

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a urethral discharge, with gonorrhœal antecedents, I propose now to consider, and to indicate the remedial measures which in my own experience have proved most productive of benefit.

When, after a longer or shorter time, the acute symptoms of an attack of gonorrhœa have subsided, and there remains simply a muco-purulent, painless discharge, examination should be carefully instituted, with the view of ascertaining the exact point to which the disease has extended, and, as nearly as possible, the pathological condition upon which the continuance of the discharge depends. This may be done in a rough way by pressing the walls of the urethra together and squeezing out the discharge from the meatus, making the pressure farther and farther back, until no more fluid can be made to exude. In the absence of any tenderness or uneasiness beyond the point so examined, you may conclude that the disease has not extended beyond that limit. If, in addition, a fair-sized bulbous bougie fails to detect any special points of tenderness, it may be concluded that the difficulty is dependent upon the first of the causes mentioned, viz., *a want of recuperative power in the epithelial structure*, and that there is sufficient of the gonorrhœal influence to keep up an exaggerated desquamative action, though not sufficient to excite acute inflammation. The additional fact that the membrane is kept constantly bathed in fluid, also retards the return to a normal condition by diminishing the cohesive power of the superficial cell growths. The indications for treatment then are, to apply such local means as are most likely to diminish the excess of fluid, and to stimulate the membrane to a more complete performance of its functions. Solutions of the salts of zinc, lead, and iron, combining astringent and stimulating properties in various degrees, are found well calculated to meet this double requirement. Vegetable tonics and astringents are also of value. The more thoroughly the epithelial products in the discharge are degenerated, the more stimulating and astringent is the application required; so that, when the discharge is thoroughly purulent,

the more stimulant salts, as the chloride, sulphate, or acetate of zinc, etc., will be found most beneficial; the more it approaches the mucous character, the more simply astringent should be the application. Under all circumstances, where a simple atonic condition perpetuates the discharge, no solution of any sort should be used of a strength sufficient to produce a caustic effect. Stimulation alone is required, such as results from solutions of the sulphate of zinc, or the acetate of lead, alone or in combination, and of a strength varying from one to three grains to the ounce of distilled water. When the discharge is not wholly without pain, I am accustomed to add two or three grains of the extract of belladonna to the ounce. When the discharge is small in quantity and chiefly mucous, the acetate of lead, grains one to three; the persulphate of iron, grains three to five; tannic acid, grains five to ten, are often promptly efficacious. The power of *phenol* (the so-called *carbolic acid*) to modify and arrest suppurative action, wherever located, is now generally admitted. My own experience in its use in disease of mucous membranes has been considerable, and I have seen positive benefit in quite a number of cases where a solution of two or three grains to the ounce has been used; but I have not employed it to any such extent as would at present warrant an expression of opinion as to its real value. The recent statement of a contributor to the *Cincinnati Medical Repertory*, that he had used it in hundreds of cases of gleet with magical effect, suggests a prevalence of the disease in that region which is appalling; while an entire forgetfulness to cite the supposed pathological conditions in any case, would warrant a suspension of judgment as to the accuracy of the recital. Other journals have presented testimony of its efficacy in the treatment of urethral discharges. The antiseptic and antiparasitic qualities of *phenol* certainly warrant an expectation of usefulness in discharges of a specific nature, and it seems to me not improbable that it may come to be a valuable agent in the management of gonorrhœal disease. The permanganate of potash, three to five grains to the ounce, has been

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highly recommended in simple chronic gonorrhœa. I have used it in perhaps twenty cases, with the apparent effect of arresting the discharge for a short time, but have invariably been obliged to resort to other means to complete the cure. The mode of application of solutions to the urethral mucous membrane which I have been accustomed to employ is by injection with a hard rubber syringe, of the capacity of half an ounce, and constructed with a well-rounded extremity, so that it may be easily and painlessly introduced, and the meatus readily and effectually closed around the pipe after insertion. Inasmuch as it is desirable that the injection should be applied only to the diseased surface, the urethra should be closed by pressure with the thumb and finger at the point previously fixed upon as the depth to which the disease has penetrated; with this precaution the danger (which is not an imaginary one) of establishing a new focus of disease by forcing the vitiated secretions into the deeper parts of the urethra, or even into the bladder is avoided. A very general impression exists in the profession that fluids are with difficulty injected into the deeper parts of the urethra by an ordinary syringe, and that to force them into the bladder, by that means, is a physical impossibility. The positive statements to that effect by various authors (Acton, Milton, etc.) would tend to confirm such a belief. Within the past two years I have had three patients who were able to inject their respective bladders by means of an ordinary Davidson's syringe, one of them throwing in a pint of water, in my presence, then emptying the viscus—refilling and discharging it three times in succession. I am, therefore, convinced that it is judicious to limit the distance we desire to medicate, by pressure on the canal at a given point. And I also believe that the whole diseased surface can usually be reached by a properly constructed syringe of ordinary size. After directing the patient to pass his water (for the purpose of cleansing the canal), the medicated fluid should be thrown in quickly, to avoid spasmodic resistance, filling the urethra to the desired limit, and allowing it to remain for from one to

three or four minutes. This procedure I am accustomed to have repeated three or four times in the twenty-four hours.

If, notwithstanding the use of injections administered after the manner I have indicated, the discharge still continues, though in decreased quantity, no other cause of failure appearing prominent, I am led to infer—

That the medicating fluid does not reach all points of the diseased surface; that, from insufficient distention of the canal, portions between folds of the membrane, or in the sulci of some of the numerous follicles with which the urethral lining is studded, have escaped the topical application. For security against failure, I am accustomed to introduce the injection through a modification of the ordinary syringe, as repre-

SYRINGE NOZZLE (HALF SIZE).

sented in the cut. By means of this instrument the urethra is penetrated to the farthermost point of disease, distended to its full capacity and thoroughly bathed with the contained fluid. No point or portion can escape the application, except it be located in the lacuna magna, or in some accidental follicular sinus. These exceptions I am inclined to think are not very rare. Dr. Benjamin Phillips, in his treatise on "Diseases of the Urethra," states that he has found the continuance of a chronic gonorrhœa to depend upon the engagement of the *lacuna magna* in the disease, and cites four cases of cure by slitting up the inferior wall of that sulcus on a director. I have met with two cases of similar character which were successfully treated by injections introduced by means of a blunted hypodermic syringe. Under the designation of "*follicular sinuses*," I allude to little fistulous canals which are sometimes met with running outward from the urethra, and occasionally opening upon the surface of the penis.

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I have a record of two and possibly of three such instances. The first, in a gentleman who presented himself to me suffering from a very scanty muco-purulent discharge of two years' standing, which, commencing as a gonorrhœa, had resisted much treatment. Close to the meatus—say a quarter of an inch—on the right side, two minute openings were visible, each the size of a pin's-head, one above the other, and about one-fourth of an inch apart. The patient remarked that, after connection, he always noticed a little matter at these points. Examining the fossa navicularis, I found its floor occupied by a narrow superficial ulcer a third of an inch from the orifice and half an inch in length. Exploring the fistulous openings with a fine probe, I endeavored to find a communication between them and the ulcer of the fossa, but was unable to do so. I did find, however, a fine canal connecting the two abnormal orifices, which I slit up and cauterized. The ample meatus received a No. 20 F.* bulbous sound with ease, but was arrested at the point of ulceration, and would only allow the passage of No. 16. I slit the constriction, which extended the entire length of the ulcer, and passed a No. 20 Béniqué sound into the bladder without difficulty. Twenty days afterwards, the wound was cicatrized, and the discharge had disappeared. I felt confident to the last that there had been a connection between the openings on the surface and the ulcer of the fossa, but failed to find it. Five years have passed since then, but the patient, who married about that time, has had no further urethral trouble.

The second case was that of a young man from Omaha, who came to me presenting a pustule the size of a pin's-head on the right side of the meatus urinarius, midway of the glans, and about one-third of an inch from the labium. Believing it to be the result of a vicious connection four days previous (as it had quite the appearance of a follicular chancroid), I cauterized it with a fine glass point charged

* Whenever the letter F occurs, following figures, it indicates the French measure, i. e. by millimetres in *circumference*. One millimetre equals $\frac{1}{25}$ inch.

with nitric acid, and felt warranted in giving the assurance of speedy cure. Two days following, the patient presented himself, with the lesion cicatrized, but a similar pustule had developed about a quarter of an inch above the site of the first. Confirmed by this, in my view of the chancroidal origin of the difficulty, the second was likewise touched with the nitric acid. On the following day my patient again presented himself, announcing that the first pimple had again broken out, and that he also had the *clap*. Making pressure of the glans, a drop of creamy pus exuded from the meatus and also a minute quantity of the same sort from the two little orifices on the site of the pustules. Struck with the similarity in location and appearance of these little openings with those of Case I., I at once set about exploring them. A fine silver-wire probe passed readily into one and out at the other; the lower seemed superficial. Into the upper, however, I succeeded in passing the probe nearly half an inch backward and upward on a plane parallel with the urethra. Feeling certain that a communication existed, through this sinus, with the urethra, I introduced as far as I was able the blunted point of a fine hypodermic syringe; and, having previously insinuated a bit of lint into the fossa navicularis, I injected a solution of indigo. After several unsuccessful trials, at last, on the withdrawal of the lint, it was found slightly but distinctly stained with the indigo. Shall we infer in this case that the trouble was originally a simple folliculitis creeping along an accidental sinus—possibly producing it—opening on the surface of the glans, and finally breaking also into the fossa, or was it of gonorrhœal origin, having its initial point in the external follicular opening, and after seven or eight days cropping out into the urethra? No solution of continuity could be detected in the fossa navicularis, nor was there much tenderness at any point. A ten-grain solution of the nitrate of silver was injected into the fistula, with the apparent effect of closing it entirely; the passage between the two points was slit up and cauterized. The gonorrhœa (if it was a gonorrhœa) extended very little beyond the fossa of the

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urethra, ran a very mild course, and ceased under astringent injections in about ten days.

The third case was in a Mr. D., who came to me two years since, complaining of a little boil on his penis. Examination disclosed a small purulent-looking collection between the folds of loose tissue, a little to the right of and behind the frenum. Both the surrounding inflammation and the swelling were very slight; there was but little accompanying tenderness; the deposit was covered only by transparent cutis. A slight touch with the bistoury caused it to discharge three or four drops of laudable pus. As there were no venereal antecedents in the case, I remarked that it was probably a little sebaceous follicle which had become obstructed, and that he would have no further trouble from it. Several weeks after, Mr. D. called to inform me that he was quite well of the boil, but that when he urinated the water came out of the side of his penis. On examination, I discovered a fine opening like a pin-hole at the bottom of a small, funnel-shaped depression on the site of the old difficulty. A fine silver wire probe readily penetrated it, parallel with the urethral canal, for about half an inch. Failing to find my way into the urethra by this means, I introduced the blunted hypodermic syringe, and, on driving in the piston, the fistulous communication was demonstrated by free dripping of water from the meatus.

The foregoing cases, taken together, appear to me to warrant the inclusion of follicular sinuses among the possible causes of persistent urethral discharge; and, although I find no mention made of such complications in the literature of urethral disease, I venture the opinion that analogous cases have occurred in the experience of many practitioners.

In conjunction with the local treatment, the internal administration of such special medicines as are known by experience to act beneficially upon diseased mucous tissues, especially those of the urinary tract, is often advisable. The balsam of copaiba and the oil and powder of cubebs I have prescribed with benefit, but so often have succeeded in upsetting the digestive apparatus of my patients, without securing the desired result, that I now rarely recommend their use. Much more tolerable, and, in my experience, of much greater efficacy in such conditions, is the *oleum santalum citrinum* (the oil of the yellow sandal-wood), in doses of from ten to twenty drops, on sugar or, preferably, in capsules, three or four times a day. I have seen recoveries from its use in from three to six days, after the long and faithful employment of injections and other internal medicines had proved unavailing.

Berkeley Hill, a recent English writer, speaks highly of this remedy, where it can be borne, and advises it in doses of from twenty to sixty drops, three times a day, remarking, however, that "it produces nausea and vomiting, like copaiba, though in less degree." The maximum dose I have ventured to prescribe has been twenty drops, and, in uncomplicated atony of the urethral membrane, always with good effect. A patient would now and then complain that the subject of sandal-wood fans was too often introduced in his presence to be quite agreeable; beyond the odor, however, and its giving rise to occasional slight dyspeptic trouble, the remedy appeared unexceptionable. Recent chemical investigations* have demonstrated the presence of *phenol* in the aromatic oils, such as oil of thyme, fir, cinnamon, cubebs, sassafras, sandal-wood, etc., and they are now included in the class of *phenols*. Not a few of these, cubebs, fir, thyme, etc., have long had a reputation for usefulness in diseases of mucous membranes generally, and in gonorrhœal disease in particular. Is it not possible, then, that the active curative property in each is due to the *phenol* of which the predominance in any one determines its superiority? Further chemical researches in this direction may yet discover other and still more potent remedial agents for internal as well as local use, and aid in the simplification of our now too empirical and overburdened category of anti-blenorrhagic remedies. The muriated tincture of iron, in doses of from ten to twenty

* See Squibbs's "Notes on the Phenols from Coal Tar," etc., in the Proceedings of the American Pharmaceutical Association, 1868.

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drops, repeated three or four times a day, I have found of decided benefit in asthenic gonorrhœa, even when the patient does not present the usual constitutional aspect which indicates its use. Iron, in conjunction with cantharides (as recommended by Dr. Bumstead, page 90 of his "Treatise on Venereal Diseases"), I have occasionally prescribed, with prompt beneficial results.

In cases of long standing the discharge is often found to proceed chiefly if not wholly from the deeper parts of the urethra, the bulbous, and even the prostatic portion. Treatment in these need be in no wise different from that already indicated, except perhaps in the use of long pipe syringes, to secure with certainty application of the local remedial agents to the entire diseased surface. Where the bladder evidently participates in the difficulty, as announced by uneasiness and aching in the supra-pubic region, with or without increased irritability of the vesical sphincter, and confirmed by the presence of pus in the urine drawn directly from the bladder, a daily washing out of this viscus with a solution of Squibbs's perchloride of iron, twenty or thirty drops to the pint of tepid water, has usually, in my hands, proved promptly successful in relieving the complication.

In cases where the discharge persists, notwithstanding a faithful pursuance of the above plan of treatment, and no constitutional complications are recognized, I am led to suspect the existence of the third in the list of causes upon which a continuance of the discharge may depend, viz., a granular condition at some point or points in the canal, where, from an unusual activity of the morbid processes, the mucous membrane has been completely stripped of its epithelial covering, the underlying tissue becoming involved in the inflammatory process, and ulceration results. At a certain stage in the declining inflammation, little irregular papillæ organize and sprout from the plastic lymph which has been exuded to repair loss of tissue, and these papillæ are called granulations. The tendency of loose cell-growth to condense into fibro-cellular tissue, which subsequently contracts and produces coarctation

of the urethral walls, renders the granular condition one of great importance, not only because it leads to Stricture, but because it is likewise frequently a source of free purulent secretion.

The granular condition is usually indicated by a localized tenderness on pressure or on the passage through the urethra of a sound or bulbous bougie. These methods of ascertaining the presence of such a complication are, however, liable to lead to incorrect conclusions, inasmuch as such tenderness may be produced by the natural obstructions to the introduction of an instrument at the triangular ligament, the commencement of the membranous portion, and the neck of the bladder. Besides this, such granulations may exist, and yet, on account of the absence of nerve-structure in them, produce no decided sensation on the passage of instruments. In this dilemma we have fortunately another resource, viz., *the ocular inspection of the entire surface of the canal* by means of tubes of proper construction, which may be introduced into the urethra and illuminated, so that every important point is made visible to the careful observer.

As far as known, the credit of first applying ocular inspection to the diagnosis of urethral difficulties is due to Dr. J. D. Fisher, of Boston, who, in 1824, published, in the *Philadelphia Journal of Medical Science*, the description of an instrument identical in all essential points with the endoscope of Desormeaux. At present, however, the names of Desormeaux, of Paris, and Cruise, of Dublin (who improved upon the illuminating apparatus of Desormeaux's instrument), are alone associated with the endoscope.

By their patient and careful observations and experiments, and by their large and valuable contributions to the pathology and treatment of urethral diseases through its use, they are entitled to stand eminent as authorities in that especial province. The endoscopic tubes of Desormeaux and Cruise were constructed of white metal, eight or nine inches in length. In using them I found a serious objection to the metallic surface, on account of the troublesome play of re-

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flection along their interior; and, moreover, so great a length appeared unnecessary for examinations of the anterior portions of the canal. Tubes, varying from one and a half to eight inches in length, were constructed of hard rubber by Messrs. Tiemann & Co., under my direction. The smooth, black surface of these tubes, though requiring somewhat stronger light, was entirely free from reflections, and enabled me to define with much greater certainty appearances in the field or bottom of the tube. These were distinct under reflected sunlight, and also from that thrown out by Tiemann's modified student's lamp, burning kerosene oil, with the addition of ten grains of gum-camphor to the ounce. The use of tubes of various lengths made it possible to bring the eye

MEATOSCOPE.

much nearer the desired surface, when it was located at any point anterior to the prostatic urethra, and proved, also, of further advantage in the greater ease with which the light was kept steadily on the field of the tube, and moreover, the shorter tubes perceptibly decreased the absorption of the luminous rays. Like Desormeaux's tubes, they were furnished with an entering shaft, to facilitate introduction into the urethra, and a mortice or cleft in the side, for the greater facility of making applications through them. For accuracy in locating any seat of trouble, they were graduated in one-half inches, and, to distinguish them, were called meatoscopes.

I have used these instruments exclusively for five years past, and believe I am able, through their assistance, to detect the more important tissue changes occurring in the urethral interior. Especially is the meatoscope valuable in diagnosis of the granular condition of the urethra, previously mentioned. Introduced beyond the suspected point

(the shaft being removed), a pencil of light is reflected, by means of a small concave mirror into and to the bottom of the tube, which is then slowly withdrawn. As the folds of healthy membrane roll symmetrically in toward the centre, the observer is able to note the exact point of departure from a healthy condition, and the character and extent of the lesions. The favorite seats of granular ulceration of the urethra are in the natural expansions of the canal at the navicular and bulbous portions, evidently invited by the rich diffusion of crypts and follicles in the ample folds of those parts. Not seldom the difficulty, when occurring in the fossa

MEATOSCOPE (SHORT).

navicularis, is occasioned by frequent and teasing contact with the point of the urethral syringe. No especial localizing cause being present, we should expect to find granular ulcerations of more frequent occurrence in the deeper portions of the urethra, on account of the preponderance there of the spheroidal and columnar varieties of epithelium, the cells of which, less easily detached, are also less readily reproduced than those of the tessellated kind. The location and nature of the diseased surface being determined, topical applications may be made through the reëntered tube, by means of wire stylets armed with a bit of cotton or lint soaked in the fluid selected for use.

I am accustomed to use for this purpose a solution of the nitrate of silver, of a strength, graduated in accordance with the sensitiveness of the parts, of from *twenty* to *thirty* grains to the ounce of distilled water, usually limiting the application to such an extent of surface as can be touched with the cotton at one time—the tube being held stationary. I have not unfrequently extended the application from one-quarter to one-third of an inch, sopping the surface as the tube is slowly withdrawn. I have not usually found it necessary to inspect the urethra under the light after having thoroughly

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located the diseased surface. Observing carefully the mark on the tube when the first application is made, it will usually be found that this portion is quite free from pain on the succeeding introduction of the tube, and that commencing sensitiveness indicates the point to which cicatrization has extended. At the first sensitive spot I repeat the application as before, advancing gradually, at each sitting, until the entire lesion is removed. Applications may be repeated once in from four to eight days. The field of the meatoscope should be carefully cleansed from any discharge that may be present, both in the preliminary examination and in that immediately preceding the treatment; this is easily effected by means of a bit of cotton twisted on one of the stylets. In some cases of granular urethra, I have used, instead of the foregoing plan, an injection of four or five drops of a solution of similar strength, (20 to 30 gr. to the ounce) with good results. For applications to the prostatic region—less easily reached with the straight tube of the meatoscope—the use of a long curved syringe has appeared to me preferable. When pursuing this plan, for a long time I was in the habit of locating the prostatic region by the preliminary introduction of a catheter into the bladder, measuring back half an inch from the point where the urine entered the catheter at about the central part of the prostatic urethra, then transferring the measurement to an ordinary long curved syringe. I was thus enabled to apply injections with accuracy to the desired point. About a year since I had occasion to see a patient with Dr. James Bigelow, of Brooklyn, and applied an injection to the prostatic urethra, after the manner above described. The entire success of a single application in relieving the diseased condition was so gratifying to the doctor, and the crude means through which it was accomplished so apparent, that he soon afterwards designed and presented to me a syringe-catheter represented by the annexed figure. With this ingenious instrument, both the measurement and the application are accomplished by a single introduction. The shaft of the

instrument encloses a double canal—one continuous with the barrel of the syringe, following the inner curve of the instrument, and terminating at the curved extremity of the shaft in a number of minute openings; the other continuous with the little branch-tube, and following the outer curve to the extreme end of the shaft. This (the catheter portion) is traversed by a wire which stops the opening at its extremity. On the introduction of the instrument, with the wire slightly retracted, at the moment of its entrance into the bladder a few drops of urine exude from the branch tube; the wire-stopper is then pushed in, the instrument withdrawn half an inch, and the piston driven home. For all topical applications

DEEP URETHRAL SYRINGE.

to the prostatic urethra, this syringe-catheter has, in my experience, proved admirably adapted.

The last, but by no means the least important of the local conditions capable of prolonging a chronic gonorrhœal discharge, is the alteration which may occur in the course and calibre of the urethral canal. Henry Dick, of London, who has written an elaborate monograph on the pathology of gleet, asserts that the continuance of a gonorrhœal discharge may depend on *deviations in the course of the urethra without contraction of its dimensions.* His conclusions were arrived at, by noticing, in cases where no actual disease could be detected and the discharge continued, that, on introduction of a sound, the flat handle always became oblique in the membranous portion of the canal; that wax bougies used for diagnostic purposes, when withdrawn, were crooked at that point, but without giving evidence of constriction; and that these cases were cured by the systematic introduction of sounds.

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I have seen cases which apparently presented all the above-named peculiarities, but I was, and am still, of the impression that the irregular, localized muscular action of the urethra produced the seeming deviation, and that the continuance of the discharge depended upon a lack of suppleness from general but superficial contraction or fulling up of the mucous membrane, which disappears, and along with it the discharge, on the return of the urethra to its normal dimensions.

Most frequently, however, chronic gonorrhœal discharges depend for their continuance upon positive and recognizable alterations in the calibre of the urethra—contractures at various points of the canal—the legitimate sequelæ of follicular ulcerations.

As the urine is propelled through the urethral tube, it impinges with more or less force upon any salient or contracted point. The column of fluid is arrested, and in proportion to the degree of arrest is the force of the blow upon the mucous surface at that point. More or less hyperæmia necessarily ensues, and a condition is soon established well adapted to prolong an existing gonorrhœa, or which, upon slight additional cause, such as venereal excitement, or even an unusually acrid condition of the urine, may result in the origination of a muco-purulent or a purulent secretion. We may hence affirm, as a most important axiom, *that the slightest encroachment upon the calibre of the urethral canal is sufficient to perpetuate a urethral discharge, or even, under favoring conditions, to establish it, de novo, without venereal contact.*

It is in this way that gonorrhœas occurring a few hours after exposure are *generated;* and it also explains the apparently unaccountable renewal of a urethral discharge after excitement, in individuals who have had no gonorrhœal disease for years.

Within the last two months, a gentleman, who (according to his own account) had lived virtuously for more than thirteen years, consulted me in regard to a muco-purulent discharge

which gave him painful suspicion of the fidelity of his wife. I found, on examination, that it was dependent upon a Stricture at the commencement of the membranous portion of the canal which scarcely admitted a No. 3 bougie, and yet no suspicion of Stricture had before arisen.

Some four years since, a young man came to me in great distress, requesting an opinion as to the probabilities of contagion from a muco-purulent discharge from which he was then suffering. He had a history of an acute attack of gonorrhœa a year previous, which was cured, all but an occasional very slight oozing of yellowish matter. This, after ten months' persistence, was pronounced innocuous by his medical adviser, whereupon, he went to Chicago and married. Three or four days later, finding his discharge increase, he left his bride and came to this city to inquire concerning the possibilities aforesaid. Examination in this case brought to light a narrow Stricture at the peno-scrotal angle, which had evidently perpetuated the discharge. In regard to the contagious property of such a discharge, I will simply state that, within the week he read me a letter from his bride, containing as classical a description of gonorrhœa in the female as I ever saw.

It will be readily seen that the recognition of Stricture as a cause of the origin or the persistence of a muco-purulent discharge is of the utmost importance, involving, besides the discomfort of the local trouble, other issues of the gravest moment.

While authorities differ as to the precise seat in which contractions may occur, all are agreed that their most common location is at those points where gonorrhœal inflammation runs the highest and dwells the longest, viz., the bulbous and navicular parts of the urethra.

The chief, if not the sole cause of these constrictions is the granular ulceration previously dwelt upon. The plastic lymph which is thrown out becomes organized, and finally condensing or cicatrizing, produces a narrowing of the tube to a greater or less degree, in proportion to the extent of

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tissue involved, forming, in short, what we are accustomed to designate as *Stricture of the urethra.*

I have already spoken of the difficulty of diagnosticating contractions by means of the ordinary sound or the flexible bougie. The fact that a No. 16 or even a No. 20 can be readily introduced, is no positive proof of its absence. A man may have a urethra of size No. 21, with a contraction at some point of half a line, which the instrument No. 20 will fail to announce. To obviate this source of error, Sir Charles Bell, many years since, invented the *ball-probe*, which consisted, as the name implies, of a slender rod surmounted by a metallic ball. Selecting one suited to the proportions of a given meatus, it was passed down the urethral canal until arrested by the Stricture; then this, or one of a size just permitting its passage through the contraction, was introduced through it, and allowed to remain for a few moments. On attempting to withdraw the instrument, the ball would be arrested at the posterior boundary of the Stricture, thus definitely locating its extent and position.

Le Roy d'Etiolles improved the ball probe of Bell by substituting an acorn shape for the ball, and a flexible material for the shaft, thus facilitating its introduction, and adapting the shaft more readily to the curvatures of the canal. In my own practice I have given a preference to still another modification which appears to me to combine the excellences of both instruments, viz., a metallic *olive-shaped* bulb, whose firm polished surface (like Bell's) glides more readily over the mucous membrane than the gum coat of d'Etiolles' bulb. The olivary shape, while entering as easily and defining with sufficient accuracy, is less painful on withdrawal than the more abrupt base of the acorn shape; and the small soft metal shaft unites great firmness with a degree of flexibility sufficient for ready alteration of its curve. The handle is perforated throughout its extent, thus allowing it to be slipped forward on the shaft to the meatus, and screwed fast, so that, when the situation of the Stricture has been determined, it correctly registers its depth. In explorations of the urethra

with this instrument, I am accustomed to accept the meatus, if apparently of normal size, as a gauge of the urethral calibre; that is to say, any instrument which will pass that orifice will easily traverse the entire canal if no abnormal condition is present. It should be borne in mind, however, that both

BULBOUS SOUND (IMPROVED). HALF-SIZE.

congenital and pathological contractions of the meatus are not infrequent.

A bulb, with its shaft bent to correspond with the curve of an ordinary sound, is accurately fitted to the urethral orifice, then slowly inserted and pushed gently back until some resistance is recognized. Muscular contraction may arrest the instrument at any point along the spongy urethra, but, with a little delay, this will subside. As the bulb advances it may impinge upon the triangular ligament; tilting the shaft upward will clear this point. Muscular contraction will also usually occur at the commencement of the membranous portion and at the posterior part of the prostatic, gently overcoming which, the bulb slips into the bladder. This is the usual course of the proceeding when no contraction has been recognized. After allowing the bulb to remain in the bladder for three or four minutes, it is slowly withdrawn; if contractions are present at any point, slight clinging or want of suppleness will indicate their locality, and, in moving the bulb back and forth, where resistance is appreciated, a diagnostic ridgy feel may be recognized. Should this proceeding fail in locating a constriction, I am then accustomed to slit up the meatus freely, and repeat the operation with the largest bulb that will enter the spongy portion Failing with this, a full-sized meatoscope, without the entering shaft, is introduced under the light, and slowly pressed back along the passage, carefully noting any paling or lack of flexibility of the membrane, at any point. Should this last

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effort yield no evidence of undue condensation of tissue, I am forced to conclude that no contraction is present.

Decided Stricture is not likely to escape notice; it is the *slight* diminutions of the urethral calibre that are usually overlooked, and which may keep up indefinitely a troublesome discharge. Especially at or near the meatus is Stricture likely to elude observation, and, in my opinion, the occurrence of Stricture at these points has been greatly understated by authorities. Not only is the inflammation unusually acute at this extremity of the canal, but the irritation and even excoriation, which often result from the use of improperly constructed syringes, plainly increase the tendency to plastic effusions about the urethral orifice. I will cite a single instance in point. A gentleman consulted me not long since on account of a muco-purulent discharge from the urethra, stating that he had never had gonorrhœa, nor any suspicious exposure for many years. I found a decided contraction at about a third of an inch from the meatus. On inquiry I ascertained that, in times past, when he was in the way of carnal communication with loose women, he was in the habit of using an injection of alum-water as a preventive of disease. The Stricture appeared in this case, (which I consider typical of a class) to be due to the teasing contact of the membrane by the point of the syringe. The presence of a warty or polypoid growth may interfere with the integrity of the urethral calibre—a complication which can be readily recognized by means of the meatoscope.

The treatment of contractions of the urethral canal cannot be fully considered in the limited scope of this paper. I am in the habit of employing the usual methods, gradual dilatation, rupture or internal division, according to the indications presented in each case. Always bearing in mind the tendency of Strictures to recontract, I endeavor to leave the strictured part *above*, rather than equal to the normal size, using healthy portions of the urethra as the guide, and *not* the numbers marked on the sounds. The standard measurements of the normal urethra are very well to philosophize

upon, but, practically, we must recognize and respect a distinct individuality in each case, irrespective of standards, or even of general physical proportions. A few days since I introduced with ease a No. 20 English sound into the bladder of a boy of sixteen, not overgrown. I have frequently seen adults whose normal urethral calibre did not apparently exceed half that size. The not uncommon remark, that such-and-such a sized sound has been passed, and consequently no Stricture can exist, leads to frequent error.

Engorgements of the urethral tissues occur readily after the discharge has nearly or entirely ceased. The introduction of a sound, or even the passage of urine, may cause the lips of the orifice to become suddenly florid, as though acute inflammation were present; evidently due to a want of contractility in the vessels of the part. Patients likewise complain of an aching sensation along the urethra, especially in the perineal portion, where the deeper parts of the canal have been involved in the preëxisting inflammation. For this condition I have been accustomed to make applications to the relaxed membrane of equal parts of the submuriate of mercury and tannic acid, by dipping an undersized bulbous bougie in oil, then rolling it in the dry powder, previously mixed, introducing the instrument with care until the bulb enters the bladder, then slowly withdrawing it with a twisting motion.

Sounds with little cup-shaped depressions at their extremity (designed by Dr. William H. Van Buren, of this city) are also valuable for carrying medicated unguents into the urethra. The judicious introduction of unmedicated sounds or bougies of large size is also beneficial.

For the same purpose I have frequently applied free carbonic-acid gas to the urethra, throughout its entire extent, by means of a flexible catheter attached to an India-rubber gas-receiver of two or three gallons' capacity. The receiver is placed in a chair opposite the patient. Passing the catheter down to the prostatic urethra, the stop-cock is turned, and pressure made upon the receiver by the knee of the operator.

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The escape of the gas along the sides of the catheter, with a sputtering sound, announces the successful application of the gas to the entire mucous surface of the canal. The tonic and sedative effect of this procedure is prompt and curative in many case of abnormal sensitiveness of the urethra, following chronic inflammation.

CHAPTER II.

RETROSPECT.

IN a careful perusal of the foregoing chapter it will be seen, 1st. That the subject of Gleet was entered upon with a general, if not a complete, appreciation of the causes which might be supposed capable of establishing and perpetuating it.

2d. That an essential *virus* for its establishment was denied, and that its continuance was considered to depend upon pathological conditions, the result in every case of simple inflammatory changes, complicated more or less by the anatomical peculiarities of the parts.

3d. That the diagnosis, in every case, was sought to be established through an acceptance of all the then recognized pathological processes associated with disease of mucous membranes, and by all the mechanical aids then in use, or which a critical study of the subject could suggest.

4th. That the treatment of Gleet was, at first, based upon the popularly accepted value of known remedial agents, general and local.

5th. That failure of treatment addressed to assumed pathological conditions, independent of mechanical interference with the functional integrity of the urethra, became gradually more and more apparent, until, on page 21 the mechanical obstacle was made to assume the *first* rank as a cause of gleet.

6th. That the slightest contraction of the normal calibre of the urethra was sufficient, not only to prolong a gleet in spite of treatment addressed to the inflammatory state, but "to establish it *de novo* without venereal contact."

7th. That the value of the bulbous sound was more and more highly appreciated and an improved form was presented, page 23.

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8th. That the meatus urinarius was accepted as a guide to the calibre of the urethra when free from apparent contractions, and even at that time the frequency of congenital and pathological contractions was beginning to be recognized.

9th. That a distinct individuality was claimed for every urethra, "irrespective of standards or even of general physical proportions" (p. 25).

These positions, reinforced by the experience and earnest study of nearly two more years, were again brought to the notice of the profession in another paper read before the New York Journal Association, Nov. 24, 1871, and published in the N. Y. Medical Journal of Feb., 1872, entitled

Remarks on Strictures of the Urethra of extreme Calibre, with cases, and a Description of New Instruments for their treatment, as follows:

In a paper, which I had the honor to read before the N. Y. Medical Journal Association nearly two years since, I called especial attention to the influence of Strictures of large calibre in perpetuating a purulent urethral secretion, concluding in the following terms: "*We may, then, affirm as a most important axiom, that the slightest abnormal encroachment upon the calibre of the urethral canal, at any point in its course, is sufficient to perpetuate a urethral discharge, or even, under favoring circumstances, to establish it, de novo, without venereal contact.*"

Since the foregoing aphorism was enunciated, my experience has resulted in a daily-increasing respect for slight and usually unsuspected narrowings of the urethral calibre, as a cause of establishing local points of irritation along the course of the urinary tract.

The following case presents a common phase of the difficulty alluded to:

Mr. J. W. R., a surgeon, aged forty-eight years, came to me in June last, complaining of soreness and persistent aching in the prostatic portion of the urethra, accompanied by a slight purulent discharge from the meatus. He had been a

subject of gonorrhœal inflammation several months previously, and felt confident that this had resulted in the establishment of a low grade of inflammatory action in the prostate gland. With occasional suspicions of Stricture, he had attempted to verify them by the use of sounds. At one time No. 25, of the French scale, was passed into the bladder without obstruction, but, on other occasions, no larger than 20 could be introduced. He was, however, very positive that no organic Stricture existed, but that the irritation, caused by the passage of the instrument, excited a spasmodic contraction of the membranous portion of the urethra, which arrested its progress. Attempting the introduction of a bulbous sound of as large a size as the urethral orifice would admit, viz., 27 F., I ascertained, that there was a Stricture near the meatus. The bulb fitted the opening, but refused to enter. After steady, gentle pressure, continued for three or four minutes, it suddenly slipped through a narrow Stricture about a quarter of an inch in depth. The bulb was then easily advanced for two inches, when another obstruction was encountered; this gradually yielded for about an inch, after which the passage of the sound, onward into the bladder, was easy and natural.

On the *withdrawal* of the instrument its bulb was arrested at a point 3¼ inches from the meatus by a Stricture which presented a nearly uniform resistance for one inch, when it again glided smoothly outward until arrested by the previously mentioned obstruction at the meatus. The handle of the exploring instrument was now permitted to fall, and dangled from the extremity of the penis, its bulb so firmly held by the Stricture that not a little traction was required to withdraw it.

Here, then, we had a urethra, readily admitting the passage throughout its whole length of a No. 25 sound, of the French scale, and yet the presence of two decided Strictures in its course was positively demonstrated.

The Stricture at the meatus was freely divided with the urethrotome of M. Civiale, and a No. 28 F. sound was passed

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through into the bladder. This operation was repeated, with increasing sizes, every third or fourth day, until a No. 30 F. sound was passed through the urethral canal, and was repeated at stated intervals for a fortnight. Still the purulent oozing, though slight, did not cease. Believing that the full size of the urethra had been reached, and that the continuance of the discharge was due to the long-continued engorgement of the mucous membrane adjacent to the Strictures, the use of the sandal-oil capsules was advised, under the influence of which it was hoped the trouble would soon disappear. The patient continued to take the capsules for a week, at the end of which time the discharge had quite ceased, but he still complained of uneasiness in the prostatic region, and still found shreds of mucus in his urine. Sound No. 30 F., of the Béniqué curve, passes quite readily, but the patient complained of unusual tenderness on its passage through the prostatic portion of the canal. From the locality and character of his sensations, he was confident that his whole trouble was in the prostate. On the withdrawal of the sound, a little of a grey secretion was observed at its extremity, and which, under the microscope, was found to be largely purulent. This secretion, it seemed to me, had been brought from the prostatic portion of the canal. Examination *per rectum* revealed slight prostatic tenderness, but no hypertrophy. Endoscopic examination, half an hour after urinating, revealed nothing except a slightly congested condition of the mucous membrane in the vicinity of the previously mentioned points of Stricture, and the presence within the prostatic portion of the canal of the secretion previously examined. With these evidences of the existence of a chronic prostatitis, I injected five drops of a solution of nitrate of silver (grs. xxiv. to the ounce of distilled water) by means of Dr. Bigelow's prostatic syringe. Shortly following the injection, and for five or six succeeding days, the patient expressed himself as having felt a decided improvement; he also reported perceptibly less flocculi in the urine. Three injections, of the character previously used, were administered at intervals

of eight days, but no further improvement resulted; on the contrary, a slight reappearance of the discharge at the meatus, with an increase of the prostatic discomfort, had occurred about the seventh day after the first application of the nitrate of silver. These symptoms again ceased upon the second application, but only to return at about the same time as on the previous occasion; a like repetition of the advance and retrograde movement occurred upon the use of the third and last injection. Suggesting the possibility of a Stricture of large calibre still remaining, I introduced bulbous sound No. 28 F., and found that it accurately measured a Stricture, the posterior boundary of which was $3\frac{1}{4}$ inches from the meatus, and which had been previously dilated to No. 30 F., three degrees above the supposed normal size of the urethra as indicated by the size of the meatus. I then introduced the shaft of Voillemier and passed upon it the largest dilating cylinder, measuring *thirty-two* millimetres in circumference, and corresponding with about No. 20 of the so called American scale. Under this distention the doctor recognized distinctly the sensation of rupture at the point of constriction. But little pain was experienced during the operation, and only slight temporary discomfort followed it. This occurred at 8 P. M., November 10th. Since that time the patient has been entirely free from the old unpleasant sensations in the prostate, and also from any sign of discharge from the urethra; the only evidence of any trouble continuing, is the slight mucous flocculi that still appear in the urine.

I have now under my care another case, Mr. A., aged twenty-eight, in whose urethra some half-dozen bands of Stricture from one-eighth to one-fourth of an inch in breadth are present, anterior to the bulb. These have been dilated so that conical sounds from No. 28 to No. 30 F. have been passed with more or less difficulty, at intervals of from four to eight days, for nearly two months. A few days since I introduced Voillemier's divulsor with shaft thirty-two millimetres in circumference (the largest attainable), and with but little more discomfort to the patient than that which had

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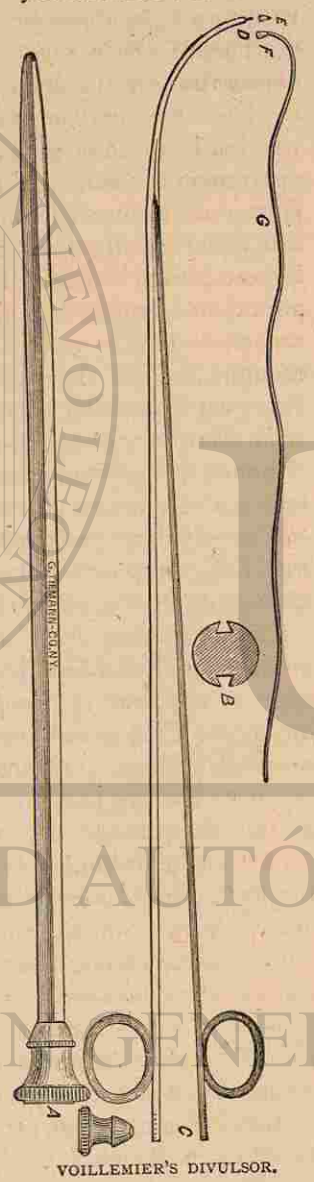
followed the use of the 30 F. sound—yet bulbous sound No. 26 F. still defines the bands of Stricture very distinctly. Such a degree of resiliency, in my own experience, is uncommon, although I have seen repeated instances where it was almost as great.

On a former occasion, the importance of recognizing a distinct individuality, in every urethra, was insisted on, and likewise, the measurement of the calibre of each, not by any popular standard, but by the introduction of the largest-sized bulbous sound that would pass the uncontracted meatus. With this as a guide, the discovery of urethras presenting a calibre freely admitting a 30 F. sound will not prove of so rare occurrence as at present supposed. Contractions at the meatus are a fruitful source of failure to appreciate abnormal narrowings of the urethra; the complete suppleness and resiliency of the tissues of the normal meatus is a good test of its freedom from organic Stricture, but congenital contractions, to a greater or less extent, are not unfrequent. Here, both the natural suppleness and resiliency may be present, and the deformity may escape notice, unless carefully sought. Wherever a bulbous sound can, by a gentle pressure of three or four minutes' dura-



VOILLEMIER'S DIVULSOR.

tion, be made to slip into the fossæ navicularis, and in the withdrawal is abruptly arrested, the indication for the free division of the meatus is positive; without it no efficient exploration of the deeper parts can be effected.

The chief embarrassment which arises, after the demonstration of these Strictures of large calibre, is from the lack of instruments of sufficient size to divide or rupture them. The largest divulsing instrument of Mr. Thompson, of London, will not expand to a size equal to more than 28 F. The largest capacity of Mr. Holt's instrument is not greater. My own Holt, purchased some years since, had only a divulsing capacity of 25 F. until I had a larger cylinder made, which brought it up to twenty-eight millimetres. The instrument of largest capacity for the internal division of Stricture is that of M. Maisonneuve, and, with the widest blade, this only corresponds to a sound *twenty-eight* millimetres in circumference. It is scarcely necessary to call attention to the *entire incapacity* of dividing or divulsing instruments to deal efficiently with Strictures occurring in urethras whose normal calibre exceeds their own measurement.

The divulsing shaft of Voillemier, measuring thirty-two millimetres in circumference, and which is the largest instrument of any kind at present in use for operations on Stricture, failed to rupture the Strictures in the case of Mr. A., previously cited. Of what possible consequence, it may be asked, is the presence of a Stricture, of a calibre sufficient to permit the passage of a No. 32 F. sound, where the normal calibre of the urethra is evidently several millimetres smaller? Briefly, that experience has shown the power of such Strictures to keep up irritation, and even a purulent secretion, at various points along the urinary tract, as was the case in the instances just related. Simple over-distention of such Strictures, or of *any* Strictures, is at best but a temporary expedient. Complete rupture or complete division is the only method by which the speedy return of a Stricture to its original point of contraction can be prevented. Every practitioner of much experience in operations for Stricture must have

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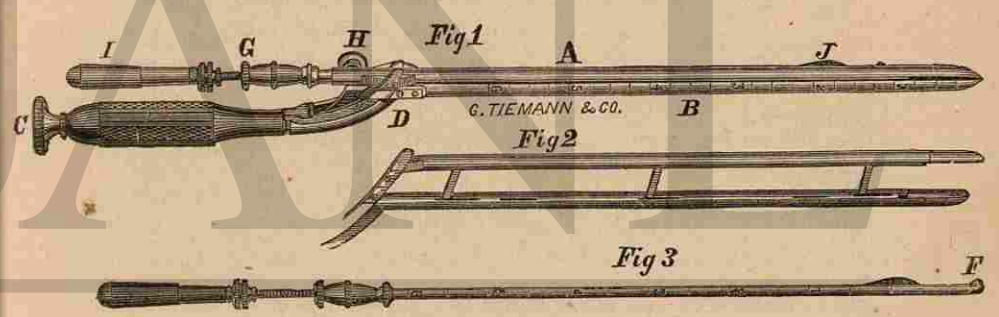
been struck with the lack of uniformity in results by any and every method, as shown by the return of patients for treatment, after variable intervals from the date of operation. Taking into consideration the difference in the regularity with which patients continue the use of dilating instruments after an operation, it is evident that data on this point must of necessity be very imperfect; but I have noticed, in cases *where no after dilatation was practised*, more permanent results in operations upon *tight Strictures* than upon those of *large calibre*. This, it has seemed to me, was because the tight Stricture was more thoroughly ruptured or divided, and that the Stricture of large calibre was more likely to be simply over-distended or imperfectly divided, on account of its inferior density and greater dilatability, as well as from insufficiency in size of the instruments employed.

The great defect in all the means now in use for operations upon the variety of Stricture under present consideration, viz., those of large calibre, is their want of adaptability to the dimensions of the Stricture upon which operation is required. In operating on the flaccid urethra the amount of resiliency of the Stricture is undetermined; the divulsing shaft is, therefore, selected without exact data, and the size of the blade in the cutting instruments being left to conjecture, is liable to be unsuited to the case. In small Strictures a certain positiveness of result is attainable, the Stricture is divulsed or divided to an extent sufficient to relieve present emergency, but there is no assurance that the rupture or the division has been complete, and, unless this result is attained, the return of the Stricture to its former dimensions is certain, and likely to be speedy, unless combated by the regular and frequent use of suitable dilating instruments. I would not be understood as at all undervaluing the great advantages, nay, blessings, that have resulted, and must continue to result, from the intelligent use of the admirable instruments of Maisonneuve, Holt, and others. In their prompt and ready relief of close Strictures they leave little to be desired, and must always occupy a prominent place in cases of emergency, when the chief consideration

is to relieve a threatened or actual retention of urine. I simply hold that there is an uncertainty in the extent of their action; uncertainty as to whether or not the Stricture has been completely divided, or whether other tissue, besides that involved in the contraction, has not also been divided or otherwise injured; and that, in Strictures of large calibre, they are, as at present constructed, often entirely insufficient. With the view of supplementing these important defects, I have designed the accompanying instrument, which was manufactured very perfectly by Messrs. Tiemann & Co., 67 Chatham St., under my direction, and especially intended for operating upon the Strictures of Mr. A., in whose case the 32 F. shaft of Voillemier was used without effecting their rupture.

The instrument, which I term *the Dilating Urethrotome*, consists of a pair of steel shafts (A & B, Fig. 1), connected together by short pivotal bars, on the plan of the ordinary



DILATING URETHROTOME.

parallel ruler, as shown in the expanded instrument, at Fig. 2. Its expansion and contraction are effected by means of a screw which traverses the handle connected with the lower shaft and is moved by means of the finger-button (C). Attached to the distal end of the screw is a pair of short, curved, registering arms, seen at D, Fig. 1, which ride through grooves on either side of the shafts (A & B), and are marked, on one side, with the divisions and corresponding figures of the American scale, on the other with those of the French, in millimetres. Connected with the screw in the handle, the

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rise and fall of this register indicate exactly the degree of separation of the shafts, and consequently the precise progress of the dilatation. Upon the inferior shaft (B) is engraved a scale of inches and quarter inches, by which the depth of its introduction into the urethral canal may be noted. Up to this point the instrument is simply a *divulsor*, and may thus be used by introducing it into the urethra until its distal extremity is beyond the supposed point of Stricture; the finger-button (C) is now turned, dilating the instrument, until, if considered desirable, the Stricture is completely ruptured.

The upper bar of the instrument, which is hollowed out, is traversed by a urethrotome (Fig. 3),* the distal extremity of which terminates in a little metallic knob or indicator, (F, Fig. 3); by the metallic handle (G, Fig. 1) of the canula of the urethrotome, it is moved, at will, through the entire length of the shaft (A) of the divulsor; a small button-screw (H), secures the canula at any point. Running through the canula, and attached to the handle (I), is the staff of the urethrotome, terminating in a thin, narrow, spring blade, which, when at the extremity of the canula, is concealed in the deep groove which extends on its superior aspect through its entire length. On withdrawing the handle of the urethrotome (I), (its canula being fixed firmly at any given point by the button-screw,) (H), the spring blade (J, Fig. 1) rises out of the groove by means of a little elevation on its floor, rides over it, displaying the full width of the blade (from one to two lines) for half an inch, when it again drops down, and is concealed in the groove of the canula.

The instrument, with its contained urethrotome, having then been passed down beyond the supposed or known point of Stricture and dilated until the Stricture is made tense, the button-screw (H), is turned, releasing the canula, which may then be drawn carefully outward until the knob or indicator at its extremity is arrested by the Stricture. The canula is then advanced about half an inch and secured by a turn of

* This form of urethrotome, with concealed spring blade, was invented by M. Ricord, of Paris, and presented to the profession some years since.

the button-screw (H); a rapid movement of the handle (I), of the urethrotome *outward* brings its blade up through the Stricture from behind forward, incising it almost instantaneously, and passing down again into its concealment. The finger-button at the extremity of the handle of the divulsor is then turned, and the instrument again dilated sufficiently to ascertain whether or not the Stricture is completely divided: if not, the knife may be passed down, *from before backward*, completing the operation. Should other Strictures be present, the use of the indicator, the urethra being kept tense, will reveal the exact locality of each, and the blade may be applied as required. The especial advantages claimed for this instrument are, that it first makes the Stricture *tense*, thereby establishing it as a fixed point; that it is capable of being adapted to Strictures of any size within its compass; that it accurately defines their locality and extent; that it attacks a tense instead of a flaccid Stricture, and hence, that its work is approached with confidence; that its incisions are made with ease, at a predetermined point, depth, and extent, instantaneously, and with the slightest possible discomfort to the patient; and, lastly, that it combines great strength with ease and simplicity of manipulation. Since the completion of the instrument, four weeks ago (May, 1870), I have operated with it on six cases of Stricture in the ante-bulbous portion of the urethra, with complete success and satisfaction in every particular. Its compass is from 23 F. to 34 F., corresponding to 13 and 21 of the English scale. Messrs. Tiemann & Co. are confident of their ability to make one of similar pattern which shall range from 23 F. down to 18 F., corresponding to 13 and 9 of the English scale, and so curved that it may be readily applied to the deeper portions of the urethra. But it is for operating upon Strictures of large calibre that this instrument has been designed, and, except in such cases, especial superiority over others in use is not claimed.* It will, how-

* The only dilating urethrotome of which I find any record is that of M. Reybard (Traitè Pratique des Rétrécissements Du canal de l'Urètre, par M. le Dr Reybard, Paris, 1843, p. 205). The principles on which the instrument of M

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ever, I think, prove a valuable aid in completely restoring the natural calibre of urethræ that have been imperfectly operated on by other instruments.

Reybard was constructed required long and deep incisions of the urethral canal, in consequence of which "the instrument, never extensively used, has fallen into disuse" (Thompson on Stricture of the Urethra. Third edition. London, 1869. p. 235).

CHAPTER III.

RETROSPECT.

THROUGHOUT the period covered by the preceding chapter, it will be seen, 1st. That there was a steady progress of the mechanical views in regard to the nature and continuance of gleet.

2d. That the meatus was practically rejected as a guide to the normal urethral calibre (p. 32).

3d. That the incapacity of all the then known instruments for dividing or divulsing urethral Strictures was demonstrated (p. 33).

4th. That complete sundering of Stricture was necessary to prevent speedy re-contraction (p. 34). And hence, that an instrument of wider scope and more certainty in action was required.

5th. That to fill these indications my first dilating urethrotome was invented, and presented to the profession as theoretically capable of completely dividing Strictures of large calibre.

The apparently successful practical application of the instrument in six reported cases was not deemed sufficient to warrant more than a casual mention, and this but as an incentive to a more extended trial of its qualities.

During the succeeding year (1870–'71) my experience in the use of the dilating urethrotome had extended to the division of fifty-seven bands of Stricture in twenty-seven patients. In every case the presence of long standing gleet was associated with the Strictures. In every case, cure of the gleet followed rapidly on the removal of the Strictures and in five cases complete absorption of the Stricture tissue was found to have occurred, a fact verified by the distinguished surgeons mentioned on pages 48, 49. These results, so remarkable and

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opposed to the teachings of all authorities and experience, were accepted with reserve by other surgeons who were practically cognizant of their truth, and not less so by myself, final judgment being deferred until a larger experience should have accumulated. They were however deemed so important that it was thought advisable to present the subject up to that date, to the Medical Society of the State of New York, together with a new form of dilating urethrotome adapted for use in Strictures of smaller calibre. Accordingly at the February meeting of that Society in 1873, I read the following paper:

On Strictures of the Urethra. Results of Operation with the Dilating Urethrotome, with Cases.

In a paper read before the Medical Journal and Library Association of the city of New York, and published in the New York Medical Journal of June, 1870, especial attention was directed to the influence of Strictures invading but slightly the calibre of the urethral canal, as a cause of purulent urethral discharges. It was then claimed that "the slightest abnormal encroachment upon the calibre of the urethra at any point in its course is sufficient to perpetuate an existing urethral discharge, and even, under favoring conditions, to establish it, *de novo*, without venereal contact." Through an article published in the same Journal, in February, 1872, this position was reënforced by the results of a further experience and study of the subject. A number of cases were then cited, where a chronic purulent urethral discharge was associated with, and apparently dependent upon, the presence of one or several distinct bands of Stricture, and where, on account of the large calibre of the Strictures, the use of the largest divulsing instruments of Thompson, Holt and Voillemier, had proved ineffectual in rupturing them. The entire incapacity of those instruments, as well as of the cutting instrument of M. Maisonneuve, was demonstrated by actual measurements which proved the divulsing capacity of the largest instrument of Thompson to be no more than

17 English, or 28 millimetres in circumference; that of Holt, as usually constructed, about the same; that of M. Voillemier 19½ English, or 32 F.; while the cutting instrument of M. Maisonneuve, with widest blade in use, did not exceed a capacity of 21 millimetres in circumference (corresponding to 11½ of the English scale); and this blade had been objected to by eminent surgeons on account of its extreme dimensions.

Among the cases presented in proof of this alleged incapacity was one of Mr. A., in whose urethra some half a dozen bands of Stricture were present, anterior to the bulb. The history of this case is as follows:

Mr. A. came under my observation November 22, 1865, having a chronic urethral discharge, following a gonorrhœa contracted a few months previous. He had used various injections, which failed to afford more than temporary relief. Examination revealed a decided contraction of the meatus, which was at once freely divided with Civiale's urethrotome; after which, under the use of astringent injections, the discharge soon ceased, and he had no further trouble until May 20, 1867. At this time, after an impure connection, the purulent discharge re-appeared. Again treated with mild injections, and full sized sounds, the discharge ceased on the eighth day. June 29, 1868, he again presented himself with a return of the discharge, which, being submitted to treatment of the same character as before, disappeared, but more slowly, only ceasing on the 22d of July. Remaining well up to June 7, 1871, he returned with the same difficulty. Endoscopic tube No. 20 F. was passed easily down to the bulbous portion of the canal. On withdrawal, the urethra was found generally congested, presenting at several points a sensitive, granular surface. Bulbous sound No. 22 F. met with slight resistance at an inch from the meatus, and also at the sensitive points beyond. On withdrawal, the bulb was firmly held at an inch and a quarter from the meatus, when a Stricture, one-fourth of an inch in breadth, was positively defined. This Stricture was incised with a narrow, straight bistoury, and the granular points were submitted to applications of a solution of nitrate

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of silver through the endoscope. Under this treatment the discharge diminished, but did not cease entirely, although the granulations had disappeared, and the mucous membrane was of nearly uniform color throughout the straight portion of the canal. Gradual dilatation was then made, and treatment by injections and medicated bougies, resorted to at regular intervals, combined with the internal use of cantharides and iron, and later with the oil of the yellow sandal-wood, until August 14, 1871, by which time the calibre of the urethra was brought up to No. 30 F. The 30 F. bulbous sound was then used, and by its aid a Stricture one inch from the meatus was recognized (on the original site), and passed with some difficulty. No. 28 F. bulb detected the same obstruction, and, being carried to the deeper portion of the urethra, on withdrawal, *five* other bands of Stricture were defined : one at four and a half inches from the meatus, one at four, one at two and a half, one at two (each about a quarter of an inch in breadth), and another, of nearly half an inch in breadth, at an inch and a half, and separated by but a narrow interval from the one previously operated on at one inch from the meatus. No 30 F. conical sound was then passed down through all, immediately after which No. 28 F. bulb was again passed, which on entrance and withdrawal, again positively defined all of the above mentioned Strictures. This was on August 14, 1871. I then introduced the divulsing instrument of M. Voillemier, and drove the largest shaft (No. 32 F.) rapidly down through all. The resistance to its passage was not sensibly greater than that previously found in passing No. 30 F. sound. After the operation and at the same sitting, No. 28 F. bulb was again introduced, and still distinctly defined all the strictured points; even No. 26 F. bulb indicated the points of contraction.

Having thus failed to rupture the Strictures with the largest instrument available, and finding that the largest blade of the urethrotome of M. Maisonneuve could only reach to the calibre of No. 21 F. and the patient continuing unrelieved of his discharge, I devised an instrument for the

purpose of effectually dividing the Strictures, upon the presence of which I confidently believed the persistence of the discharge to depend. This was presented to the profession, in an unfinished state, at a meeting of the Medical Journal and Library Association, November 24, 1871, after a brief allusion to the salient features in the case of Mr. A., just cited, as the one for the complete division of whose Strictures it had been contrived. This instrument, which I have termed the *Dilating Urethrotome*, I had the pleasure of presenting to the Association after having tested its efficiency in the case above related, and in the treatment of other Strictures of large calibre.

On the morning of the 12th of January, 1872, adapting this instrument to the calibre of Mr. A.'s Strictures, and having made such tension as the patient could comfortably bear, I drew the blade of the urethrotome through the anterior Stricture, one and a half inch from the meatus, cutting from behind forward, then giving the dilating screw half a turn more, I incised it from before backward, closed and withdrew the instrument. On examination of the result with the 30 F. bulb, no resistance in entrance or withdrawal could be detected at the site of the Stricture. The patient averred that he had not experienced the slightest pain on the passage of the knife; the subsequent hæmorrhage was very slight, and ceased in a few moments. Mr. A. then went down to his business. He called on the following morning, and stated that he had accomplished his usual work on the day previous and had had no discomfort since the operation, except a slight smarting on urination.

On the 11th of February I operated in the same manner on the second anterior constriction, with the same result as in the first.

On the 24th of February, examination showed a complete freedom from obstruction at the points previously incised, and an entire absence of the purulent discharge. At this date, I operated on the two succeeding Strictures—one at two inches and one at two and a half—and the patient was

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directed to use the 30 F. sound daily until no bleeding followed.

On Monday, March 4th, the remaining Strictures, at four inches and at four and a half, were divided, and the cut surfaces kept asunder, by the occasional introduction of a sound, until March 11, 1872, subsequent to which date no treatment of any kind has been resorted to. Early in October last, seven months from the date of the last operation, Mr. A. called to consult me in regard to a difficulty unconnected with his genito-urinary apparatus. On inquiry, I ascertained that he had had no evidence of any trouble with his urethra since his last visit, on March 12th. In a careful examination of his urethra with No. 30 F. bulbous sound, I was now unable to detect the slightest contraction or lack of suppleness at any point.

CASE II.—*November* 16, 1871.—Mr. M. S. came to me with the following history: Had gonorrhœa first ten years since; was treated without injections; disease lasted several weeks. A couple of years subsequent to this he had a whitish discharge from his urethra, which he first noticed shortly after connection with a woman who had scarcely completed her menstrual period. The difficulty was quite painless, but lasted noticeably for four or five months. One year after, or seven years ago, he had what was supposed to be a fresh attack of gonorrhœa, in which the inflammation ran very high, and lasted for several weeks. In this seizure he was treated by injections, in addition to internal remedies. A gleety discharge followed the acute symptoms, and lasted for a year, when a third acute attack occurred. To this last he paid no especial attention, until inflammation of the left testicle supervened and confined him to his bed for several weeks. From that time he received occasional treatment for a gleet, which still annoyed him, but he never obtained more than temporary relief. On one occasion, following a connection, severe irritation at the neck of the bladder was set up, which, after a few weeks, appeared to yield to homœopathic treatment, and left him with his old gleet which continued with slight variations up to November 16, 1871. On this date I examined his urethra; meatus apparently healthy and of normal calibre—No. 28 F. Bulbous sound No. 20 F. revealed a Stricture one and a half inch from the meatus, exceedingly sensitive, and bleeding freely at the slightest touch.

November 19th.—Conical sound No. 21 F. was passed under protest, on account of the sensitiveness of the part; free bleeding again followed.

February 24th.—Occasional introduction of sound since the last record has relieved the sensitiveness and tendency to hæmorrhage, and raised the calibre up to 23 F. Bulbous sound again used, and showed the Stricture at one and a half inch from the meatus to consist of three distinct bands close together—the first one-fourth inch in breadth, the second half an inch from it, of about same breadth, and the third separated from it by scarcely a quarter of an inch. The dilating urethrotome was then introduced with the blade, set for the posterior Stricture, expanded up to 26 F., which was all the patient would bear, and the Stricture was incised from behind forward, and also from before backward, without moving the instrument. It was then closed and set for the anterior Stricture; this was also divided, the instrument closed and withdrawn. The patient remarked that the pain of the entire operation was not sensibly greater than that following the first introduction of the sound. The incision bled quite freely, but the hæmorrhage, under gentle pressure, soon subsided. The results of the cutting were not then examined.

February 27th.—Examination with No. 27 F. bulb showed resistance, on entering upon the site of the second Stricture. On withdrawal, a narrow band was found remaining; this was cut, March 8th, after the manner of the previous operation, and No. 27 F. bulb passed beyond the site of the Strictures, until, at three inches from the meatus, another narrow band was discovered, and at four inches still another. Although these last Strictures were distinctly appreciated by the patient as well as by myself, he expressed an unwilling-

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ness to submit to any further interference until he could ascertain whether or not the previous operations would give him relief from his discharge.

March 23d.—Patient has introduced No. 27 F. sound past the seat of his anterior Strictures at intervals of a day or two since his last visit, as directed by me, in order to maintain the complete separation of the previous incisions. This was advised to be continued until no oozing of blood followed the use of the instrument. The locality of the wounds made in the previous operation was examined through the endoscope, and healing was seen to have been complete, but the discharge was still present. At this time, by the patient's request, the dilating urethrotome was introduced, dilated to No. 27 F., and the deeper Strictures were again examined and readily defined by means of the indicator attached to the extremity of the canula in which the blade of the urethrotome runs. The instrument was then adjusted for the posterior Stricture. This was rapidly incised on its superior surface. Setting it again for the anterior band, a like incision was made through it; a turn of the dilating screw giving no pain to the patient was the evidence that the division of the Strictures had been complete; but the patient, fearing an imperfect result similar to that occurring in the first operation, requested that the Strictures might be incised on the inferior surface also. Seeing no objection to this, I did so, measuring their locality from the outside, as they could no longer be distinctly defined by the indicator. The incisions on the superior aspect of the urethra were attended with but little hæmorrhage, but those on the inferior surface were followed by copious bleeding, which was only controlled by the introduction of a large flexible bougie. Removing it after an hour, a gush of blood followed. It was then readjusted and retained by a bandage, for the night. The following day, on removal of the bougie, blood again flowed freely. A hard rubber tube was then introduced, through which the patient could urinate. This was worn constantly for the three succeeding days. No. 28 F. sound was then introduced with ease,

and patient directed to pass it upon himself daily for one week, since which time I have not treated him for his Strictures. The gleet disappeared, without other care, in about a fortnight after the last cutting, and he has remained free from it up to the present time. I made a careful exploration of the urethra of this patient in the early part of October last (1872), nearly seven months from the date of the last operation, with No. 28 F. bulbous sound (the previously noted calibre of the meatus), and was unable to detect any remains of Stricture at any point.

CASE III.—Mr. J. C. came under my care in July, 1870, with the first attack of gonorrhœa, which lasted for two months, under a combined treatment of copaiba and injections. Subsequent to this, from drinking much beer, he had several returns of the discharge, which readily disappeared under the use of mild injections. In July, 1871, a profuse, painless purulent discharge followed a suspicious connection. This resisted the usual local means, but was controlled by large doses of the oil of the yellow sandal-wood (twenty drops three times a day), but reappeared on the withdrawal of the remedy. Examination, December, 1871, revealed a congenital contraction of the meatus, admitting only 16 F. I cut it with Civiale's Urethrotome, and introduced 24 F. Examination with the endoscope showed two broad inflamed and granular surfaces, involving the entire circumference of the urethra, at about two inches and five inches from the meatus. These were treated by the application of a 30-grain solution of the nitrate of silver through the endoscope, at intervals of three or four days, for about a month. Under this treatment the mucous membrane was apparently restored to its normal condition, the discharge ceased, and the patient was believed to be cured. Within a few weeks, however, after a debauch, the difficulty returned, and continued, without treatment, for several months. January, 1872, he presented himself with a scanty, thin, purulent discharge. Examination detected Stricture at two inches from the meatus; No. 24 F. bulb passed it with difficulty, and on withdrawal was sharply and firmly

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held. Passing the instrument farther, another band of Stricture was recognized at four and a half, one at four and three-quarters, and one at five inches. The anterior Stricture was then divided by the dilating urethrotome, and 30 F. sound passed easily through. This instrument was directed to be passed daily until healing of the wound was complete. March 30th, some discharge, though thin and scanty; no obstruction to passage of 30 bulb through site of anterior Stricture, but it was arrested at 4¾ inches. The dilating urethrotome was then introduced, and the three posterior bands previously described were dilated and cut above and below; after which operation 30 bulb passed without hinderance through all. Patient directed to use 30 F. sound, until no bleeding ensues.

After this time I lost sight of this case, until January 30, 1873, a period of ten months, when, accidentally meeting him, I requested an opportunity of ascertaining the results of the operations. He stated that the discharge continued for about six weeks after the last operation, and that he had had none since, although he had drunken very largely of beer, which had, previous to the operations, always brought back the discharge. Examination with bulbous sound 30 F. failed to detect the slightest trace of a Stricture in the course of his urethra. No. 31 was also passed and withdrawn without detecting any unevenness in the urethral walls at any point.

In connection with the three cases above cited, it seems proper for me to state that, with the consent of the gentlemen operated on, I invited several prominent surgeons of the city of New York to meet them at my office on the 20th day of December, 1872, for the purpose of critical personal examination of the results of operations with the dilating urethrotome. Dr. Henry B. Sands and Dr. Robert F. Weir made the examination in the first case, that of Mr. A., with No. 30 F. bulbous sound; in that of Mr. S., the second case, with No. 28, and completely confirmed my impressions as to the entire absence of any abnormal condition in the urethra in both cases. Again, on the first day of February, 1873, the three cases above related, together with that of Mr. W. (operated on in May, 1872, for two Strictures, one at one-third of an inch from meatus, and one at an inch and a half)—making in all four cases (comprising originally eighteen bands of Stricture) were critically examined at my office by Drs. J. W. S. Gouley, Thos. T. Sabine, and Fred. D. Sturgis, of New York, and Dr. F. D. Lente, of Cold Spring, New York.

The examination of Mr. S. (previously examined by Drs. Sands and Weir) was made with the bulbous sound No. 28 F. In this case there had been no abnormality at or near the meatus, and 28 had been accepted and registered as the normal calibre of his urethra before the operations were made. In the remaining three cases the 30 F. bulb was first used, and afterward No. 31, without detecting in either case any obstruction or unevenness in the course of the urethra, either in the insertion or in the withdrawal of the instrument. I have now operated with the dilating urethrotome on 58 bands of Stricture, presenting in 27 patients. The presence of long standing gleet was the cause of their seeking relief in every instance. And in every instance, with one exception, the gleet had disappeared within 24 hours as the shortest and one month as the longest time after the final operation. The exception was in the case of J. C., case third reported, where frequent indulgence in venery and alcoholic stimulants was kept up throughout the treatment. This list, moreover, includes four cases where a Stricture was left uncut in the curved portion of the urethra beyond the reach of the instrument as then constructed.

In no case was any after-dilatation practised by me or by my direction, subsequent to the healing of the incisions. In one case a gentleman, who had for years been in the habit of occasionally passing a steel sound, continued to do so every two weeks for a couple of months succeeding the division of his Strictures; but finding, as he said, "*not the least resistance*," he abandoned its use. With the exception of the operation in Mr. S., which was followed by a troublesome hæmorrhage, nothing has occurred in any case to interfere with the regular habits or occupation of the patient. The

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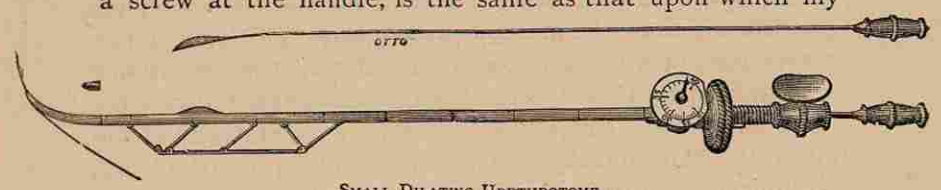
dilatation is capable of being made so gradual that no shock is experienced from that cause, and the tension falling solely on the Strictures, renders them almost and often wholly insensitive; thus the incisions are virtually painless. I have, therefore, in no case preceded or followed the operation by the administration of quinine or morphine, as has always been my habit when employing the instruments of Holt, Thompson, and Maisonneuve. During the frequent use of this form of dilating urethrotome, the objections which have suggested themselves are—1. Its large size, it being of a circumference of 23 millimetres, equal to 13 of the English scale, when closed, and not capable of material reduction. 2. That it is incapable of being used in the curved portion of the urethra. Recognizing the importance of combining dilatation with division in the treatment of urethral Strictures, and appreciating the defects in my instrument, my friend, Dr. J. W. S. Gouley, of New York, contrived an instrument, with expanding springs, intended to remedy these defects. Dr. Gouley's

Dr. Gouley's Dilating Urethrotome.

instrument possessed the great advantage of having a circumference of no more than 12 millimetres, equal to No. 5 of the English scale; but it was open to the objection that, on account of the elliptical shape which the dilated springs necessarily assumed, the tension on the Stricture might be easily lost by slight slipping of the instrument, when failure in complete division of the Stricture would inevitably result. To avoid the possibility of such an accident, and to reach the deeper portions of the urethra, I devised the instrument which I now present. This specimen, also constructed by Messrs. Tiemann & Co., is equal in size to 13 millimetres, or 5½ of the English scale, and is capable of material reduction.

Its mechanism is exceedingly simple. The principle of its action being that of the parallel ruler, expanding by means of a screw at the handle, is the same as that upon which my



Small Dilating Urethrotome.

original instrument is constructed. The cutting apparatus is also virtually the same. An independent rod, terminating in a blunt elevation, plays the part of the *bougie-à-boule* for the detection and location of the Stricture points. In order that it may readily be passed down into the curved portion of the urethra, its shaft, which terminates in a copper probe-point, may be easily adapted to the curves of the deeper portions of the canal, and also enables the operator to arrange it for cutting at will upon either the superior or inferior aspect of the urethra, and, when straightened, can be used as well for operation upon Strictures in the straight portion of the canal; a movable hard rubber slide marks the required depth of insertion. Its efficiency was demonstrated at my office, January 29, 1873, in the presence of Dr. F. D. Sturgis, of New York, by the complete division of a Stricture of a previously ascertained breadth of three-fourths of an inch, and situated one and three-fourths inch from the meatus; the calibre of the canal was thus raised from 23 to 28 millimetres by a single passage of the knife. This instrument has an expanding power up to 40 F.

In the above recital of my experience with the use of the dilating urethrotomes, it will be observed that two somewhat novel ideas are suggested—1. That a very considerable number of cases of chronic urethral discharge are dependent upon the presence and influence of comparatively slight contractions of the urethral calibre; and 2. That the complete division of the cicatricial tissue producing such contractions may be followed by an entire absorption of the cicatricial, or

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stricture tissue, and this quite independently of the long-continued use of sounds insisted on by all authorities as necessary to prevent re-contraction of the Stricture. Now, in regard to the dependence of chronic purulent secretion upon interference with the calibre of the urethra, it may be stated that, in order to effect a complete emptying of its contents after micturition, a complete and healthy action of the muscular layer surrounding it must occur. The presence of any condition which interferes with this, necessarily produces irregular and imperfect emptying of the urethra; its acrid contents are retained for a time, and to a degree, sufficient to become a cause of irritation. This, it will readily be seen, may occur from such a slight plastic infiltration as simply interferes with the suppleness of the tissue without interference with the normal calibre of the canal. Thus Strictures, dilated even beyond the normal size of the urethra, still may give rise to an irritating influence upon the mucous lining of the canal. When, besides, there is an *actual narrowing* in the course of the urethra, "the urine impinges with more or less force upon the contracted point, the column of fluid is arrested, and in proportion to the degree of arrest is the force of the blow upon the mucous surface at that point; more or less hyperæmia necessarily ensues, and a condition is soon established well adapted to prolong an existing gonorrhœa or gleet, or upon slight additional cause, such as venereal excitement, or even an unusually acrid condition of the urine, to result in the establishment of a muco-purulent or a purulent discharge without antecedent contagion."

In claiming the general dependence of chronic urethral discharges upon disturbance of the urethral calibre, I am not unaware of the importance attached by many specialists to the presence of local points of granulation, or papillary hypertrophy, along the course of the canal. Accepting the views of Desormeaux, Cruise, and others, I have, in days past, been a firm believer in the value of the Endoscope for defining those points with certainty by ocular inspection; and in

the efficacy of local treatment by strong solutions of the nitrate of silver applied to the granulated surfaces through the Endoscope; but I have, of late, so frequently observed the same appearances, and by means of the large bulbous sounds have been able to detect bands of Stricture underlying them, and further, have seen the granular condition of the mucous membrane promptly disappear upon the complete division of the Stricture, without any other treatment, that I have come to look upon the Endoscope as a mischievous invention as used for the relief of chronic urethral discharges. The improvement and often apparent cure, which I have seen resulting from local applications through the Endoscope, has proved fallacious, for slight and often unrecognized causes have determined the return of the difficulty. I therefore now venture the opinion that localized granular urethritis will be found to result from interference with the muscular movement or with the calibre of the urethra in every instance.

And now, as to the second point. No one could have been more surprised than myself, when, on my quite accidental examination of the urethra of Mr. A., in October last, I found that complete absorption of the cicatricial tissue had occurred. The interest excited by the apparent result of complete division of the Strictures in this case, (which, it will be remembered, was the one in which six distinct bands of Stricture were present before the operations, and whose case was cited before the New York Journal Association in November, 1871), induced me to seek an examination of patients where like operations had been performed at or near that time. This resulted in the collection of *five* other cases, making six in all—four of which, with an aggregate of seventeen bands of Stricture, were examined by committees of surgeons especially skilled in urethral diseases. In cases Nos. I., II., and III., the final operation was performed in March, 1872, and the results examined in the first two in October, 1872; the third, January 31, 1873. Case IV., operated in June, examined in November; Case V., operated in April, and examined in October; Case VI., operated on in

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July, and examined in November. In all these, an entire absorption of the Strictures was absolutely demonstrated.

The above list includes *all* the cases in which I have, thus far, had an opportunity of instituting a final examination. Quite a number of those operated on came from a distance, which fact, and the indisposition of Stricture patients to disclose their places of residence, have prevented an extension of the list. The generally-accepted view of authorities, in regard to the results of operations upon Strictures of the urethra by any other method than that by the dilating urethrotome, is, that there is a liability to relapse, and that, as a rule, unless dilatation, by the occasional passage of a full-sized sound, is kept up *indefinitely*, recontraction of the Stricture is likely to occur.

In consideration of the fact that, by every other method except that by combining incision with dilatation, the operation is upon a flaccid urethra, with no accurate guide to the necessary correspondence between the size of the operating instrument and the Stricture, and that there are many Strictures of larger calibre than can be sundered by the largest instruments in general use, it may be justly inferred that the Strictures operated on by such means are, as a rule, not *completely ruptured or divided*—that the Stricture is still left in its continuity, and hence the frequency of relapse. If, on the contrary, the Stricture is completely sundered at any point, and by subsequent dilatation a space is filled in with new material, when contraction takes place—as cicatricial tissue is certain to do—this contraction naturally takes place at the expense of the weaker new formation, resulting, as it seems to me, in a wider separation of the sundered ends, the irritation consequent upon contraction of the calibre of the canal, and the retention of the irritating secretions, thus decreasing, hence, the reënforcement of the Strictures, by additional plastic material, diminishes, until, by the natural tendency to absorption of foreign or superfluous tissue, the Stricture-tissue gradually and completely disappears. Should this view of the *modus operandi* of the complete absorption of the

Stricture, after complete division, not prove satisfactory, the profession are invited to suggest a more plausible explanation of the fact, which, it seems to me, must be accepted in regard to the six cases, (for the most part aggravated examples of their kind) which I have had the honor to report to this Society.

In the cases brought before you it will have been remarked that the occurrence of several distinct bands of Stricture in the same urethra is asserted. On this point Sir Henry Thompson, on "Strictures of the Urethra," London edition, page 68, remarks; "Occasionally several separate Strictures may be observed in the same subject. John Hunter records six, Lallemand seven, Colot eight, Du Camp four or five, Leroy d'Etiolles (inventor of the bulbous sound) eleven, and for the most part in the spongy portion of the urethra." Three or four are as many as Sir Henry Thompson has been able to discover.

Among the patients which I have operated on during the past year there were present six in two cases, five in three, four in one, in three cases three, out of twenty-seven cases observed. Dr. Gouley has recorded four cases with four Strictures in each, and over twenty cases, in each of which three were distinctly defined with the bulbous sound.

The rarity of the occurrence of multiple Strictures in the same urethra, as reported by authorities, is, I am sure, due to an imperfect method of examination. The use of the ordinary sound is quite valueless in the attempt to recognize or define slight contractions of the urethral canal, which often readily dilate to its normal calibre, while they can be perfectly demonstrated by a bulbous sound two or three sizes smaller. I have frequently met with Strictures which could not be appreciated during the passage of a full-sized bulb, but which, after being allowed to remain for a few moments, was perceptibly arrested at a point of Stricture on its withdrawal. I may then state it as my conviction, that the bulbous sound is the only instrument which can be relied upon for certain diagnosis of Strictures of large calibre. For explorations of

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the straight portion of the urethra, I prefer the metallic olive-shaped sound; for the curved portion, the olive-shaped gum bougies. Contractions at the meatus, either congenital or resulting from disease, are of frequent occurrence. Civiale recognized this fact, and is said to have "divided the meatus in nearly three thousand cases, with the best results." Dr. Gouley states that he has divided over two hundred.

By this simple operation I have many times relieved chronic discharges and inflammatory troubles of the urethra and bladder, which had resisted every other method. When such contractions exist, there can be no efficient exploration of the urethra previous to complete division, whether the contractions be cicatricial or congenital. Any resistance to the withdrawal of any bulbous sound which can be introduced through the meatus, is positive evidence that an abnormal contraction is present sufficient to render nugatory a thorough examination of the deeper portions of the urethra. Bearing this fact in mind, and appreciating the value of the full-sized bulbous sound as a means of diagnosis, I believe that the detection of important urethral contractions will be vastly more frequent, and that complete division of such contractions will result in the relief of much annoyance and suffering from gleet, urethral and vesical inflammation, and irritation, which cannot be permanently removed by any other means.

The metallic, olive-shaped sound, with a small, flexible shaft passing through a perforated handle, to which a thumb-

IMPROVED BULBOUS SOUND.

screw is attached for fixing it at any desired point (see Fig.) is one of a set which I have used very frequently for the last twelve years, and has proved in my hands superior to those of any other form or material in use for examination of the straight portions of the urethra, on account of the complete ease of its introduction and withdrawal, and of the ex-

actness with which it defines and measures every degree of Stricture. Its value is also enhanced by its freedom from liability to injury by use or time.

For the relief of close Strictures requiring immediate operation, on account of retention of urine, or where, by reason of irritability or extreme density, such Strictures are not susceptible of being sufficiently dilated, the instruments and methods of Maisonneuve, Holt, and Thompson are, and I believe must always remain, of inestimable value. Although inadequate for complete and permanent restoration of the urethral calibre, yet, the immediate emergency being relieved, the remaining disability, I am hopeful, may be removed at leisure, by the supplementary use of the Dilating Urethrotome, and thus the continued, often uncertain and perilous, use of sounds or bougies, now required after the ordinary operations on Strictures, be virtually abolished.

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CHAPTER IV.

RETROSPECT.

THE foregoing paper was received by the Society with amiable attention, but called forth no discussion.

On its publication in the New York Medical Journal for March, 1873, it elicited no expressions of opinion or interest in the leading medical periodicals at home or abroad. The claim of curing gleet by division of Strictures, often not appreciable by straight bougies or bulbous bougies of the ordinary sizes, and, still more startling, the suggestion of the *radical cure* of Stricture were too improbable to warrant public consideration.

As time went on however, an increasing experience steadily strengthened my convictions on all the important points claimed. In addition to these I recognized more and more the necessity of ascertaining the normal calibre of the urethra in every case associated with urethral or vesical irritation; and also, the utter worthlessness of the meatus urinarius, as a guide to that calibre. The bulbous sounds, of which I had found a necessity of increasing the size up to 34 mm. were efficient explorers where the meatus urinarius was large, but were rendered useless for exhaustive examination, in all other cases, until after division of the urethral orifice.

Gradually I became convinced, that the nearer the meatus urinarius corresponded in size with the urethra behind it, the more nearly it approached the highest perfection, and that the fossa navicularis was the result of forcible dilatation, caused by a contracted meatus, (p. 33).

To measure the urethra, independently of the size of the orifice, seemed a great desideratum, not alone for detection of contractions or Strictures, but to harmonize the many conflicting statements by authorities in regard to the normal

urethral calibre. During the latter part of the year 1873. I devised an instrument which I termed the Urethra-metre, which promised to settle all the vexed questions in regard to urethral measurements. For the purpose of presenting this instrument to the profession (p. 77), and of discussing the views of Sir Henry Thompson (p. 70, et seq.) in regard to the methods of examination of the urethra for Stricture, and to combat what I believed to be a grave error of the English and French schools, in claiming an average standard for all urethræ, and still further, to demonstrate the possibility of the complete cure of Stricture (p. 81), I read a paper before the N. Y. Medical Journal Association in February, 1874. This was published in the N. Y. Medical Journal for April, 1874, as follows:

Urethrotomy, External and Internal combined, in cases of multiple and difficult Stricture; with Remarks on the Urethral Calibre.

In the early part of the year 1872, two cases of urethral Stricture presented in my service at the Strangers' Hospital, which were decided to be appropriate cases for the external or perineal incision, from the fact that the first was the subject of impassable Stricture at the bulbo-membranous junction, and that the second was suffering from a long, close, perineal Stricture, admitting only the finest whalebone filiform bougie, and also further complicated by the presence of several perineal fistulæ. The method of operation differed in some respects from that usually performed. The practice approved by authorities in such cases is to cut down upon a sound or other instrument which has been introduced through or down to the point of Stricture, and then from without to incise freely all Stricture-tissue until an instrument, sound or catheter, of the supposed normal dimensions of the urethra, can be readily passed through the urethra into the bladder. In the cases above alluded to, the modification of this procedure consisted in making the external perineal incision in great measure subsidiary to the operation of inter-

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nal urethrotomy. This plan was determined on for the first case, with the idea of including in the same operation several Strictures which were present in the straight portion of the urethra, as well as the impassable one for which the perineal incision was demanded; and for the second, to avoid the necessity of laying open the scrotum in the division of the long Stricture, which was found to pursue a tortuous course through a mass of indurated tissue traversed by the perineal fistulæ.

The preliminary steps in this modified operation were taken as if the ordinary perineal section had been contemplated. An incision was then made down upon the anterior face of the Stricture, aiming to enter the urethra by as small an opening as possible, and through this opening, as a new point of departure, the endeavor was made, in the first case, to introduce a fine, soft, filiform guide through the posterior Stricture. Succeeding in this, the staff of Maisonneuve was entered at the meatus, and passed down through and past the perineal incision into the bladder; blades of the instrument, Nos. 2 and 3, were then slid down the staff in succession, cutting on the superior wall of the canal and dividing all remaining Strictures. A large silver catheter was then passed into the bladder. In the second case the same plan was pursued, with like result, as far as the contraction posterior to the incision was concerned, and a large bougie was passed from the incision into the bladder; but there still remained the long and close Stricture anterior to the perineal opening. A filiform guide was then passed from the meatus urinarius through the urethra and out of the perineal incision; the staff of the instrument of M. Maisonneuve was then screwed upon it and also passed through the urethra and out of the incision; this was followed by the blades Nos. 2 and 3 in succession; after which a full-sized catheter was passed through the entire urethra into the bladder.

The result of these operations proved highly satisfactory in both the cases alluded to, detailed accounts of which were published in the *New York Medical Record* of April 15, 1873.

Among the advantages which it seemed to me might be legitimately claimed for this modified perineal section, were —1. That it methodically included in the same operation all points of Stricture in the urethra, with only a limited division of the external urethral walls, and yet one sufficiently extensive for the free discharge of urine and of the fluids resulting from the operation. 2. That all divided Strictures, anterior to the perineal opening, were protected from contact with the urinary secretion after operation; thus obtaining the advantages of each operation, viz., external section and internal urethrotomy, and at the same time lessening the disadvantages if not the dangers of each as separately performed. With the view of illustrating still further the value of the procedure above described, and in order to call your attention to some important imperfections in the modes of procedure ordinarily pursued in the treatment of urethral Stricture, the following case is presented:

On the 31st day of July last, Mr. W. C. H., merchant, aged thirty-three years, presented at my office, with the history of a gonorrhœa thirteen years previous. This was severe in its accession, and, through the aid of strong injections, continued in a highly inflammatory stage for fully one month. It was supplemented by a free, almost painless muco-purulent discharge, which, in spite of a variety of treatment, internal and by injections, continued, in a greater or less degree, through all the succeeding twelve years and up to the present time. He had his first trouble in urination seven years ago, after excess in wine and sexual indulgence. This resulted in an attack of retention of urine, which was relieved after several hours' effort on the part of the surgeon, by the introduction of a flexible filiform catheter. From that time he had frequently been obliged to resort to the introduction of the catheter, but had never since suffered from retention. For the last two or three years he had been troubled with occasional attacks of intermittent (urethral?) fever, but was not aware that he had ever been exposed to any malarial influences.

He passed his water *guttatim*, but says that, occasionally,

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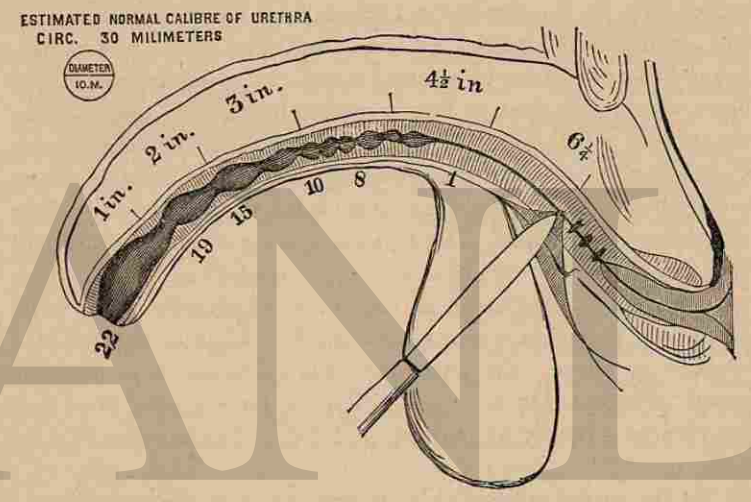
he passes it in a fine, short jet, and that his condition in this respect has not varied materially for the last five years.

Examination showed the external genito-urinary apparatus fully developed; penis in flaccid condition, three inches in length, and three inches in circumference; from this I estimated the normal calibre of the urethra to be No. 30 F. Bulbous sounds detected a Stricture at the meatus, extending one one-third of an inch, measured by No. 22 F.; one at one inch, No. 19 F.; one at two inches, No. 15 F.; one at three inches, No. 10 F.: six distinct bands from three inches to four and a half, defined by No. 8 F.; beyond four and a half inches, No. 1 filiform passes to six and a quarter inches; ½ m. whalebone, closely hugged, is finally arrested at seven and a quarter inches. Examination of the urine shows freedom from albumen, an occasional pus-globule, a few epithelial scales from the urethra and bladder, but none from the ureters or pelvis of kidney. No casts. The foregoing measurement of Stricture and condition of urine were reviewed from time to time without the appreciation of any marked changes, and with no further progress toward entering the bladder up to November 4, 1873. On this date an operation was decided upon. Present Dr. George A. Peters, Dr. George W. Ives, the patient's family attendant, and Dr. J. De Forrest Woodruff.

As the initial step in the anticipated operative procedure, ten grains of quinine and one-quarter grain of morphine were administered. The patient was then placed under the influence of ether, and the calibre and location of each of the Strictures were verified (as compared with the measurements already given) by the use of bulbous sounds and bulbous filiform bougies. It was then decided that the modified perineal section was indicated as affording promise of most rapidly and certainly restoring the urethra to its normal calibre.

No. ½ whalebone filiform bougie was passed down to six and a quarter inches, beyond which it could not be persuaded. With this as a guide (which was skillfully managed by Dr.

Peters), I made an incision from a point just behind the scrotum to within an inch of the anus, cutting carefully down in line with the centre of the sub-pubic arch, until I came squarely upon the whalebone guide. At this point in the operation the knife was laid aside, and with No. 1 silver grooved-probe, entering the urethra through the incision from before backward, I passed it readily into the bladder. I then introduced the staff of the urethrotome of M. Maisonneuve alongside



the probe into the bladder. A slight pressure accomplished this, when the probe was withdrawn, and the largest blade of M. Maisonneuve (capacity 22 F.) was passed, distinctly arrested at three points on its course, and, on withdrawal, a 20 F. catheter was introduced. No urine flowed, although the end of the instrument was felt to be free in the bladder. This was withdrawn and found to be obstructed by a clot, but contained urine. No. 24 was substituted, with precisely the same result. It was then concluded that the curved catheter passed up above the line of urine present. No. 24 straight catheter was then substituted, and the clear urine flowed freely through it. The straight catheter having been

closely embraced on entering, indicated some persistence of Stricture. I then introduced a straight, probe-pointed bistoury along it, and incised dense cicatricial tissue for fully an inch; withdrew the catheter, and passed No. 31 F. steel sound through the external incision back into the bladder.

The next step in the operation, after thoroughly incising the Stricture at the meatus, was the passage of the ½ mm. filiform whalebone guide through the urethra, from the meatus down to and out of the perineal opening, then sliding down upon it the staff of a Maisonneuve (which was perforated at the extremity for this purpose),* it finally emerged from the perineal incision. The smaller blade of the urethrotome was then driven slowly down the staff, arrested abruptly at each Stricture, and required all the force which could be used without bending the shaft of the knife, before its passage through the spongy portion of the urethra could be effected. This was followed by a blade of the second size, with much the same results. A passage of the third and largest blade was then attempted, but this, after passing with great difficulty, through each of the Strictures, up to three inches, was finally arrested at that distance. After a thorough trial, in which I was efficiently supported by Drs. Peters and Woodruff, it was found impossible, on account of the density of the opposing Strictures, to divide them with this instrument. The staff of Voillemier's divulsor was then introduced through the Strictures and out of the perineal opening, and rapid divulsion made with the largest shaft (No. 30 F.). On examining the results of this last procedure, it was found that 28 F. bulbous sound was arrested at two inches. No. 26 passed, and defined the posterior face of the Stricture at two and a half inches; the same instrument was arrested again at four inches, finding slight resistance for half an inch, then passed freely down to the perineal incision. The (my) small dilating urethrotome was then introduced through the posterior Stricture, turned up to 30 F., and the narrow blade of the instrument drawn through it. This urethrotome was then adjusted to the

* The filiform traversing the entire length of the staff.

anterior Stricture, which was in like manner incised from four inches to four and a half (*i. e.*, about one-half inch). No. 31 F. steel sound was then easily passed down through the entire urethra into the bladder; thus evidencing—as much as the introduction of an ordinary steel sound can do—complete division of all the Strictures.

The patient rallied quickly from the effects of the ether, having been under its influence just one hour and three-quarters. The hæmorrhage occurring during the operation was slight, only two superficial vessels requiring ligature. At the end of a half-hour there was not the least oozing from either the wound in the perinæum or from the meatus; there was no complaint of pain subsequent to the anæsthesia; and, as I was leaving him, he emphatically expressed himself as feeling "*bully*."

From the date of the operation, November 4th, until the 10th, the patient, who was seen daily by either Dr. Ives or myself, had not the least untoward symptom. He had an average pulse of 76, and temperature not above 98¾°. His urine, over which he had complete control, was passed *entirely through the perineal opening* for the first three days, after which a small portion found its way through the anterior section of the canal. A conical steel sound, No. 24 F., was now (six days after the operation) passed through the extent of the urethra, and followed easily by Nos. 25 and 26 F. A slight gush of blood followed No. 26 F., but stopped in a few moments. On the 12th passed Nos. 28 and 30 F.; patient, as on the previous occasion, doing well; says he has not had an ache or a pain since the performance of the operation. Hæmorrhage occurred on the next day, following the act of micturition; this was evidently from about the middle of the spongy portion. Dr. Ives was called; eight or ten ounces of blood were lost before it was completely arrested.

14*th*.—Tenth day after operation. Wound in perinæum closing healthily; passes water about equally through it and through the urethra anterior to it; feels well, eats well; walks about his room, or sits in his arm-chair, with equal

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comfort. No further instrumental procedure was had until two weeks subsequently (December 28th), when he called at my office, saying that he felt quite well in every respect, that his stream was full size, and that only a few drops came through the perineal opening; he had gained several pounds in weight, and was looking in good condition. Examination of the urethra detects a recontraction of the Stricture at one and a half to two inches from the meatus, 17 F.; rest of canal apparently clear. Ordered ten grains of quinine.

December 4th.—Pass 17 F. easily, then 19 F., which was closely hugged.

6th.—Find the Stricture at from one and a half to two inches composed of two firm bands close together; introduce small dilating urethrotome; expand it to No. 28 F., with difficulty, on account of the great density of the Strictures; draw the blade of the urethrotome through them from behind forward, and pass 26 F. conical sound readily down into the bladder. No. 26 F. bulb passes down to the membranous urethra and returns, without giving any positive evidence of further recontraction at any point. Patient took ten grains quinine, and then started for home, three miles distant, in the cars, with directions to keep quiet for the remainder of the day.

Two days subsequently (December 8th) patient reports that there had been no hæmorrhage, no disturbance nor discomfort whatever following the operation, except slight smarting on urination: pass 25 and 26 F. conical sound with ease.

9th.—Patient calls to say that he had a smart chill, followed by fever and sweats, coming on about five hours after the introduction of the sound yesterday. Ordered five grains quinine to be taken three times a day.

12th.—Patient reports himself in good condition, having had no further trouble; a few drops of urine still exude from the perineal opening during micturition, but he passed *per urethram* a full and comfortable stream; 28 F. passes readily through the entire urethra.

15th.—Perineal incision completely closed; discharge

quite gone; patient makes a full and satisfactory stream · repeat passage of 28 F.

22d.—Pass 28 F.; 29 F. attempted, but finds resistance from three inches increasing to four and a half; smart bleeding followed the withdrawal of 29 F. Ordered ten grains of quinine.

29th.—Patient reports that, on the morning following the passage of 28 F. and the partial passage of 29 F. at his last visit, he had a succession of severe chills, and bleeding with stoppage of water about half the length of the penis, after each urination; finally a clot was expelled, and he had no further trouble. To-day a very sensible contraction is found at three inches, which permits only the passage of 23 F.

January 8th.—Examination with bulbous sound No. 24 finds a recontraction at one and a half inch; one at two and one-eighth, which arrests it; 17 F. only will pass, and is held on return at three inches. After which 23 F. conical sound is passed through the urethra without force, and followed with ease by 24 F.

13th, 14th.—Defined recontraction at two and a half to two and three-quarter inches; pass 24 F. and 25 F. with ease; from this date up to the present no examination has been made, and the patient, who appreciates the fact that there are features of rare interest and value to our profession in his case, has kindly consented to submit himself to an examination of his present condition in your presence.*

* In order to facilitate the examination and to relieve the patient from the annoyance of repeated explorations, a committee, consisting of Professor Alfred C. Post, Dr. James M. Minor, and Dr. L. De Forrest Woodruff, was appointed by the President of the Association to examine the case of Mr. ——, presented by Dr. Otis. No. 17 F. bulbous sound was first carefully introduced by Professor Post in passing it down the urethra; this was distinctly arrested at the points of Stricture, at two and one-half and two and three-quarters, before mentioned, and also as distinctly defined on withdrawal of the instrument. The result was likewise confirmed by the remaining members of the committee. Dr. Otis then introduced, in full view of the Society and without force, No. 24 F. conical steel sound through the Strictures and into the bladder, the patient asserting that not the least pain was occasioned by this procedure. The removal of No. 24 F. was immediately followed by No. 25 F. with the same ease and free-

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It will be worth our while to pass in review some of the more salient points in this case, several of which seem to me to be of great practical importance.

First in order seems to be the occurrence of an extraordinary number of distinct Strictures in the same urethra. One at the meatus, defined by bulbous sound No. 22 F.; one at one inch from the meatus, defined by bulbous sound No 19 F.; one at two inches from the meatus, defined by bulbous sound No. 15 F.; one at three inches from the meatus, defined by bulbous sound No. 10 F.; six distinctly recognized bands from three to four and one-half inches, No. 8 F.; one apparently extending from four and one-half to six and one-quarter inches, permitting the passage of only No. 1 F. to six and one-quarter inches, and from this to seven and one-half inches, hugging one-third closely; three bands distinctly arresting the blade of the urethrotome when passing from the perineal urethral opening backward through the membranous portion of the canal: this makes in the aggregate *fourteen strictures*, distinctly defined and recognized by each of the gentlemen present and assisting in the original operation.

In order to appreciate the rarity of this point in regard to multiple Strictures, I will quote from a late edition of Sir Henry Thompson's work,* concerning the number of Strictures found in a single urethra: "Occasionally," he remarks, "several separate Strictures may be observed in the same subject. John Hunter records an instance where he met with *six* Strictures in one urethra: Lallemand mentions one with *seven*. Colot saw one with *eight*. Ducamp says there are rarely more than two, but that he has seen *four* or *five*. Boyer thought that *three* could exist together. A case is reported by Leroy d'Etiolles in which he found *eleven;* "but," Sir Henry further remarks, "it is necessary to state

dom from discomfort. The attention of the Society was then called by Dr. Otis to the interesting and important fact here demonstrated, that, while the bulbous sound No. 17 F. defined the Strictures distinctly, No. 25 F. steel sound failed to give any evidence of their presence.

* "Strictures of the Urethra," London, 1869, p. 68.

that this number rests only on the evidence afforded by the passage of an exploratory bulbous bougie (that is, a small gum-elastic sound with an olive-shaped extremity two or three sizes larger than the stem) on the person of a *living* patient. . . The Strictures," Sir Henry says, "to use the author's words, '*were for the most part in the spongy portion, about two and one-quarter lines distant from each other,*'—a condition," says Sir Henry, "which would perhaps be better described as *a series of irregular contractions* than by any statement of the exact number of the Strictures. Rokitansky speaks of *four*, and does not record a higher number as having come under his own personal observation." . . "My own researches," he further states, "have not led me to recognize numerous independent Strictures in one urethra. *Three* or at most *four* distinct contractions I have seen, but such instances are very rare."

With the exception of M. Leroy d'Etiolles, Sir Henry Thompson does not inform us as to the methods of exploration in use by the various authorities he quotes, which, it seems to me, must greatly affect the value of their observations; and, in regard to the method of M. Leroy d'Etiolles, he casts an imputation of inaccuracy upon it by stating that the evidence of the existence of *eleven Strictures* in a single urethra, which he claims to have demonstrated, rests *only* upon the evidence afforded by the bulbous sound; and, as if this were not sufficient to discredit the possibility of eleven Strictures coincidently existing in the same urethra, he says, "even if they were defined by the bulbous sound, that they were not Strictures at all, in his opinion, but simply *a series of irregular contractions*" of the urethral calibre. John Hunter's statement that he met with *six* is accepted—even Colot's, who claimed to have seen *eight;* but M. Leroy d'Etiolles, who claims *eleven*, is *not* accepted as having recognized *Strictures*, but has been deceived by *irregular urethral contractions*.

Why, it may be pertinently asked, with his acknowledged skill and great experience, has Sir Henry Thompson only

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been able to find *four* Strictures in a single urethra, and is evidently slow to accept the occurrence of a greater number in the practice of other surgeons? A satisfactory explanation may be found on page 147 of Sir Henry's work on Strictures of the Urethra,* where he gives directions for the exploration of the urethra with the view of ascertaining the presence or the absence of Stricture. "In order to effect this object," he says, "a flexible bougie of medium size, that is, from No. 7 to 9 of the English scale (16 to 18 French), is to be used, while as to form, it should be *rather slightly curved, and blunt, not conical at the point.*" . . . "Whatever the patient may say," he further remarks, "this rule is *always* to be adhered to. If a small instrument is employed, it might pass through the Stricture without giving any sign of its existence, and so fail to detect it; but, *if a No.* 8 *bougie* (16 French) *passes easily into the bladder, we may be satisfied that no Stricture or at most a very slight contraction only exists.*" †

"This bougie," he goes on to remark, "may be graduated in inches, for the purpose of noting at what distance from the external meatus obstruction is found."

Accepting this to be the best method of ascertaining the locality and calibre of the urethral Strictures (which I am very far from doing), I am only surprised that even Sir Henry was able to demonstrate the existence of *four* distinct Strictures in a single urethra; and, if the same method was pursued by Hunter, Colot, Ducamp, and others, I am sure the number they claim was found in *post-mortem* examination; for I do not hesitate to say that, with a straight or curved bougie, with simply a blunt end, such as advised by Sir Henry, no living surgeon could demonstrate the existence of more than three or four Strictures in any one urethra; and I will say, furthermore, that such a method is *unreliable and imperfect for the diagnosis of even a single Stricture.* Sir Benjamin Bell, who invented the ball-

* This is also repeated in his latest work on "Diseases of the Genito-urinary Organs," London, 1876, page 42.

† Am. Ed., 1869; p. 147.

probe, was aware of this fact, and M. Leroy d'Etiolles, who modified this invaluable instrument—resulting in the flexible, olive-shaped bulbous bougie—was, through its use, enabled to demonstrate on the living subject the presence of *eleven* distinct Strictures in the same urethra. Sir Henry Thompson distinctly states that, *if a No.* 8 *E. bougie* (16 F.) *passes easily into the bladder, we may be satisfied that no Stricture, or at most a very slight contraction exists.*

This teaching, it seems to me, is of the *utmost importance to combat as erroneous and leading to disastrous errors in the diagnosis and treatment of urethral Stricture.* I am the more strongly impelled to take this position from the perusal of a recent *brochure* on Strictures of the urethra, by Dr. T. B. Curtis, to whom, for this paper, the Civiale prize of two thousand francs was awarded during the past year. Dr. Curtis, the honored pupil of M. Guyon, of Hôpital Necker, and of M. Voillemier, may be safely accepted as mirroring truthfully the views of the French school of urethral surgery at the present time. In this paper he remarks, in regard to the treatment of Strictures by dilatation, page 46: "*The treatment shall be considered terminated when you shall have made to enter without effort No.* 21. You will thus have restored to the canal the calibre of 7 millimetres (*diameter*), *which represents the normal calibre of the canal of the urethra,* which is more than sufficient for the purposes of micturition;" and he goes on to say: "But the mission of the conscientious surgeon is not yet terminated. Although he may *have the right to send his patient away as cured,* he ought not only to have restored the strictured urethra to a calibre which can suffice for the passage of urine; *it is still his duty to put his patient in a position to give himself the consecutive treatment, without which all Strictures, by whatever manner treated, will relapse almost infallibly.*"* We have here laid down, on the authority of both the English and the French schools, the exact capacity of the human male urethra. Sir Henry Thompson, representing the English urethral interest, states it to be No.

* The *Italics* are my own.—F. N. O.

8 English, which is equivalent to No. 16 of the French scale. No Stricture can be permitted in any urethra where the No. 8 English bougie finds easy passage. Dr. Curtis, as the laureate interne of the Hôpital Necker, and the successful competitor for the two thousand francs prize of Civiale, in 1873, may well be accepted as representing the present status of urethral science in France; and he states, under the ægis of his distinguished masters, that the *normal calibre of the human male urethra is equal to 7 millimetres in diameter;* that, when a presenting urethra, the previous subject of Strictures, more or less numerous or pronounced, shall have been brought by various kinds of dilatation, or divulsion, or incision, or what not, up to a calibre of 7 *millimetres in diameter*, "the conscientious surgeon" has a right to dismiss him as cured. How is it, then, with the poor unfortunates, who cannot conform their urethræ to the procrustean dimensions of French and English schools, but find themselves in possession of urethræ, the calibre of which extends to the size of 8, 10, or 12 millimetres in diameter instead of 7; or 22, 24, and 26, of the English scale, instead of 8 or 9? Evidently the difference between the *established normal standard* and the figures just named (if they were within the range of possibility) *might* be occupied by Stricture-tissue, which, although it might not be recognized by the No. 8 *blunt-end bougie*, might nevertheless exist, and would inevitably be detected by a bulbous sound of a calibre corresponding with the size of this apparently extraordinary canal—*extraordinary*, if we are willing to admit the size of the meatus to be a sure indication of urethral calibre, without noting variations caused by congenital and pathological narrowings. A careful examination of several hundred urethræ, within the past twelve years, by means of the *metallic bulbous sound* (which I presented to the profession in 1861), has demonstrated to me that, while I have seen occasional extremes, varying from 28 to 40, the *average calibre of the male urethra is not less than* 30 of the French scale, or 18 of the English scale; and that the great majority of Strictures which are sources of

grave annoyance, and call imperatively for treatment, are *above* what is set down by the French and English schools as worthy of consideration. Within the past two years I have, in more than one hundred cases, recognized distinct bands of Stricture in urethræ, where the English bougie of No. 8 and even the French of No. 21 could be readily passed down through them into the bladder *without giving the least evidence of contraction at any point;* and I have frequently demonstrated this fact not only in my clinique at the College of Physicians and Surgeons, but to a large number of professional friends, in my private practice.

On the 30th of December last I invited Dr. Bumstead, the distinguished author of "Bumstead on Venereal Diseases," to see a patient, fifty years of age, at my office, with a view of examining the calibre of his urethra. The flaccid organ was three inches in length from the meatus to the pubis, and three and a half inches in circumference midway of the organ. In Dr. Bumstead's presence I introduced into and through a *normal* meatus a metallic bulbous sound 32 millimetres in circumference, and passed it down without the least force to the bulbo-membranous junction. Dr. Bumstead withdrew it, and pronounced the normal calibre of the urethra equal to 32 millimetres in circumference. I then introduced, in the same manner, bulbous sound No. 34 F.; this also was introduced and withdrawn by Dr. Bumstead, with a similar result. The *normal* calibre of this particular urethra was thus shown to be 34 millimetres.

On Saturday evening, January 10, 1874, I invited Dr. Gurdon Buck and Professor Thomas M. Markoe to examine with me the urethra of a patient, twenty-four years of age, who had never been the subject of gradual dilatation, but who had been operated on by me with the (my) dilating urethrotome for three Strictures in the straight portion of the canal. The meatus, which was originally contracted to 24 F., had been incised two months previously. The length of the flaccid organ was four inches; the circumference, midway of its length, was four inches. In the presence of the distinguished surgeons

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above mentioned, I introduced No. 36 F. bulbous sound and passed it down to the bulbo-membranous junction. This procedure was repeated by Drs. Markoe and Buck in turn, and the urethra was recognized by them as possessing a *normal calibre of* 36 *millimetres in circumference.* Previously to this trial I had announced the presence of an abnormal contraction at one and a half inch from the meatus, which was detected with the No. 36 bulb on the morning of the same day. Neither Dr. Buck, Dr. Markoe, nor myself, was able to distinguish this alleged contraction. Taking the ground that the introduction of the sound in the morning had made the contraction less salient, I took the bulbous sound next in size, which (through a mistake on the part of Tiemann & Co.) had been made of a circumference of 40 F. instead of 37 F. I pressed it gently against the orifice for a minute, when it entered and passed readily down to one and a half inch, where it was arrested by the contraction before alluded to. Dr. F. D. Sturges and Dr. J. De Forest Woodruff had verified with me the passage of No. 34 F. bulbous sound in the same urethra a few days previous.

Do you ask, of what value is the recognition of urethræ of such enormous calibre as those just cited? Simply, I answer, *to demonstrate the absurdity of fixing, upon the dictum of any man or school, a standard calibre for the human male urethra;* to show the necessity of making every urethra a law unto itself, and to enable the surgeon to judge of the greater or less degree of contraction, in any given urethra, by the normal calibre of that individual urethra, as ascertained by interior measurement. In the case presented to you tonight, is it for a moment supposed that the fourteen Strictures, ranging from No. 22 F. to one-half of a millimetre in circumference, and extending from the meatus to the prostatic portion of the urethra, came without indication or warning, until the passage of urine was interfered with?

From the original gonorrhœa, contracted more than twelve years ago, up to the time of the first trouble of micturition, five years ago, this man was scarcely free from a chronic

urethral discharge, and any surgeon, previous to that time, and subsequent to the inflammatory condition which initiated the trouble, with proper instrumental means, and sufficient intelligence, could have demonstrated the presence of Stricture, and by a suitable treatment could have arrested the contractile urethral disease in its inception. His gleet was treated by internal remedies and injections; as well attempt to remove a ligature tied *around* his penis, by internal remedies and injections, as to essay the cure of an *internal* cord, the result of inflammatory deposit in the urethral walls. Chronic urethral discharge, commonly called gleet, is the signal which Nature hangs out to notify the intelligent surgeon that an obstruction to the normal working of the muscular apparatus of the urethra has occurred; that plastic material, laid down in the antecedent inflammatory condition, has begun to contract the normal urethral calibre, whether it be 20 or 40 millimetres in circumference, and that nothing short of a complete restoration of the normal calibre of the canal will afford a permanent cure. Sandal-oil may stop it for a time; injections of innumerable variety may, any one of them, temporarily remove it; but a little vinous or venereal excess will reproduce it, and thus the case goes on, getting, as many such cases will affirm, *a new clap for every woman looked at,* until finally an attack of *retention of urine* calls attention to the fact that the patient has strictured urethra.

One of the chief stumbling-blocks in the way of the surgeon in recognizing urethral Stricture is the contracted meatus. Authorities concur, as a rule, in asserting that the meatus is the *narrowest portion of the urethral canal,* and yet this is usually accepted as a *test* of its calibre. This opening is subject to great natural variations, in organs of about the same general proportions. The well-developed penis, in a dozen cases, may vary in regard to the size of the congenital meatus, from the calibre of No. 8 or 9 millimetres in circumference, to 32 or 34. It is important to recognize the fact that the meatus bears, necessarily, *no* proportion to the actual size of the urethra. If symptoms of Stricture are

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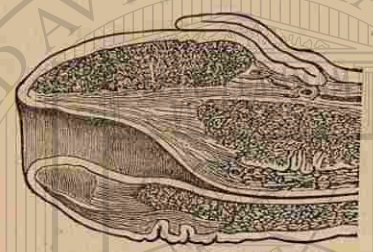
present, such as *persistent urethral discharge, etc.*, or if any chronic irritations of the genito-urinary apparatus present, the meatus should be freely incised, and a thorough examination of the canal with the bulbous sounds should be made.



VERTICAL SECTION OF ANTERIOR PORTION OF PENIS.

The normal meatus urinarius is well represented by Henle,* who has been more minute and definite in his anatomical researches in regard to it than any anatomical authority with which I am familiar.

Thus, as the accompanying plate represents, there is no abrupt enlargement after passing the external border, such as is seen in the usual representations of the urethra, and Henle, in his description, is entirely at variance with those who claim that a sort of sphincter is found at the meatus. There are no *circular* muscular fibres entering into its composition—simply horizontal muscular fasciculi, or plates, as he terms them, which surround the opening, and are continuous with the muscular structure of the urethra. Vertical sections of the penis at the junction of the glans with the body show a nearly uniform calibre throughout the fossa navicularis, as far as its external boundary at the meatus, the opening of which is of corresponding calibre. This may be accepted as the normal condition of these parts, and any variations from such uniformity may be considered aberrations from the normal condition. These are, as a rule, of no practical importance, unless the tissue composing them has been invaded by inflammatory action; in which case the muscular layer being disabled to greater or less extent, by the infiltration of plastic material, its office of aiding in the complete emptying the urethra is interfered with, and urine being retained in the canal may, by its subsequent decomposition, prove an added source of irritation.

* "Handbuch der systematischen Anatomie des Menschen," von Dr. J. Henle, p. 417.

In order to gain a definite knowledge of the calibre of the urethral canal, in cases with or without contraction of the meatus, I have devised an instrument which I term the *Urethra-metre*, or dilating bulbous sound, which I now present.

URETHRA-METRE.

It consists of a small, straight canula, size No. 8 F., terminating in a series of short metallic arms, hinged upon the canula, and upon each other. At the distal extremity where they unite, a fine rod, running through the canula, is inserted. This rod (which is worked by a stationary screw at the handle of the instrument), when retracted, expands the arms into a bulb-like shape, 10 millimetres in circumference when closed, and capable of expansion up to 40 millimetres. A thin rubber stall (Fig. C), drawn over the end of the closed instrument, protects the urethra from injury, and prevents the access of the urethral secretions to the interior of the instrument. When introduced into the urethra and expanded up to a point which is recognized by the patient as filling it completely—and yet easily moving back and forth—the index at the handle then shows the normal circumference of the urethra under examination. In withdrawing the instrument, contractions at any point may be exactly measured, and any want of correspondence between the calibre of the canal and the external orifice be readily appreciated. Among the advantages claimed for this instrument are: 1. Its capacity to measure the size of the urethra, and to ascertain the locality and size of any Strictures present, *without reference to the size of the meatus*. 2. It enables the surgeon to complete the examination of several Strictures by a single introduction of the instrument, and by reduction of its size to avoid the irritation which usually attends the withdrawal of the ordinary bougie-à-boule or bulbous sound.

Returning to the case of aggravated multiple Stricture above related, it will have been observed that notwithstanding the easy passage of a No. 31 F. solid steel sound through the entire urethra, after the operation, there was an *immediate tendency to recontraction;* that within a comparatively short period, the presence of Stricture was again definitely recognized. I do not call your attention to this important fact on account of its novelty, for every surgeon of experience has too frequently observed it; and every writer on Stricture has recorded it in terms the most emphatic; some even going so far as to state, as does Mr. Wade* (quoting the illustrious Dupuytren), that, "whatever care may be taken in the dilatation of Strictures, the *dilatation is but temporary in the greatest number of persons, and the contraction has always a tendency to return.*" Sir Benjamin Brodie says: (*op. cit.*) "After a patient has conceived himself to be cured, and after every symptom of the disease has vanished, it is not an uncommon thing for him to suffer a relapse, in all probability, of far greater danger than the previous attack. . . . From what," he asks, "does this arise? From his not continuing," says Sir Benjamin, "at regular intervals, to pass an instrument (sound) notwithstanding the disease should seem to have disappeared. To pass it once in two or three weeks is enough, but *it must never be thrown aside as useless, during the life-time of the patient, if he desires to be freed from his troublesome affection.*"

Dr. T. B. Curtis, in his prize Essay previously quoted as representing the views of the leading French surgeons, says, page 46, "*All Strictures, by whatever manner treated, and in appearance cured, will relapse almost infallibly.*"

It is, however, an accepted fact, that a certain but *very limited* proportion of Strictures are permanently cured by each of the various methods—dilatation, division, divulsion. We may again ask, with Sir Benjamin Brodie, from what does *this* arise? The answer is, simply, that, *to prevent the return of Stricture after operation, the Stricture must first have been*

* Wade on "Stricture of the Urethra," London, 1860, p. 352.

thoroughly sundered at some point, and that those Strictures which have been *permanently cured*, have been so sundered, either by rupture through dilatation more or less rapid, by divulsion or division. In this number I do not include those facetiously termed *cured*, where the patient is obliged to use or have used a sound every two weeks for the balance of his life, but those that never reappear after operation. The reason why the treatment of Stricture after the usual methods is imperfect, and that there is always a tendency of the Stricture to return, arises from the fact that, as in the case cited, the Strictures were not *completely sundered* at any point, but were only *distended*, not *completely divided*. All urethral Strictures are composed of elastic tissue, and any operative procedure that falls short of *complete* division of the constricting band *can never produce more than temporary results*. As long as No. 8 of the English and No. 21 of the French scales are accepted as representing the *normal* calibre of the human male urethra, and as long as *curative* treatment ceases when this calibre has been reached, there will never be *radical, permanent cure of urethral Stricture*. Sooner or later, however, it is certain to be accepted that urethræ vary in size in different individuals just as widely as any other constituent portions of the human body, and that, consequently, Stricture of the urethra is a *relative term;* that, while No. 8 bougie, English, or No. 21, French, will determine the presence or absence of Stricture in a urethra of corresponding calibre, it fails to recognize it in urethræ of larger size. These have been positively demonstrated in certain cases to reach as high as 36 or even 40 millimetres in circumference. *Complete* division of Stricture, *of whatever calibre*, having been accomplished, *recontraction may be prevented*, and thus strictured urethræ can, by appropriate treatment, be with certainty restored to their normal dimensions, without fear of subsequent recontraction.

This I do not assert unadvisedly or rashly, as the records of more than fifty cases, occurring in my own experience, will demonstrate. Several of these cases, in which five and six

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Strictures were present two years ago, and then thoroughly divided, have been carefully examined by me, within the last month, and can be shown to-day, free from the *slightest evidence of recontraction.* This goes far to prove that complete division of Stricture, with appropriate after-treatment, will give complete immunity from recontraction. The results of operations with the dilating urethrotome, which were presented by me to the profession at a meeting of the New York Medical Journal Association more than a year ago (May, 1870), have remained permanent; that is to say, *that the Strictures operated on, having been thoroughly divided, were afterward completely absorbed.* These results were subsequently published in the New York Medical Journal of March, 1873. One of the cases (Case III.) there reported, presenting originally five distinct Strictures, (including one at the meatus—defined by 24 F.) was operated on in January, 1872, and the completeness of the operation was demonstrated by the passage of a 30 F. bulbous sound through the urethra, and its withdrawal without giving evidence of the slightest obstruction at any point. This was one of four cases (comprising operations on eighteen bands of Stricture) critically examined in February, 1873, by a committee of surgeons composed of Dr. Henry B. Sands, Dr. J. W. S. Gouley, Dr. Robert F. Weir, Dr. Thomas T. Sabine, and Dr. Frederick D. Sturgis, of New York, and Dr. Frederic D. Lente, of Cold Spring, N. Y., with the 30 F. bulbous sound at first, and subsequently with 31 F., *without being able to detect any contraction, at any point, in any one of the presenting urethræ.* I am able to afford this Society further proof of the absolute absorption of the above-mentioned Strictures, by presenting this case (No. III.) to you for a reëxamination to-night, more than two years subsequent to the operation, in which five distinct Strictures were completely divided. In the case of multiple Strictures presented, (see page 67) it will be remembered that while 25 F. solid steel sound was easily passed through the urethra without detecting any Stricture, No. 18 F. bulbous sound was arrested at the Stricture-points. I propose, therefore, in order to put

the crucial test to this case, to examine the urethra with No. 30 *bulbous sound.* This, you now observe, passes readily and easily through the urethra, and is withdrawn without the slightest retention at any point.

I now pass the case over to your committee for the verification of my examination. (Drs. Post, Minor, and Woodruff, having confirmed fully the absence of Stricture by introduction and withdrawal of the bulbous sound No. 30, and so reported to the Association, Dr. Otis resumed.) In order to show more fully the complete absorption of the stricture-tissue in this case, I now take a larger bulb than has at any time been used. The urethra, when free from Stricture, is very distensible, and, by a little pressure, will admit an instrument above the normal calibre. Thus, as you see, this larger bulb, pressed firmly, not violently, against the meatus, now enters and passes without perceptible difficulty through the urethra. The size of this bulb is 34 millimetres in circumference.

In closing this somewhat desultory paper, I would like to be distinctly understood as claiming, that Stricture, as ordinarily met with, is *absolutely within the reach of curative measures.* If completely divided, and the division maintained by suitable means until healing of the parts has occurred, no *recontraction* can ever take place. Dilatation, temporary or persistent, *is never more than a palliative measure*, unless carried to a point sufficient to *completely rupture the Stricture.* Division of Stricture is not more hazardous, to say the least, than persistent dilatation, by introduction of instruments, which are required to remain *in situ* for hours or days, or than rapid dilatation, which requires instruments of increasing sizes to be introduced at one sitting. And I venture to say it is scarcely more likely to produce trouble than temporary or transient dilatation, as usually practised by surgeons, at intervals of two or three days or weeks, for the rest of the natural life of the unfortunate patient. I here call your attention to a point in the history of Mr. W. C. H., whose numerous Strictures in their relation to the foregoing *résumé*, are very instructive. His chills occurred on two occasions during the

progress of the case, each time following the *easy and gentle introduction* of a No. 29 F. steel sound; while the *division* of the Stricture was not followed, in either instance, by any such result. This gives me an opportunity to state that, in nearly two hundred operations with the dilating urethrotome, performed by me on urethral Strictures, chiefly in the straight portion of the canal, within the past two years, I have met with no untoward result, beyond four troublesome but not serious cases of after-hæmorrhage. Slight chills have occurred in but six cases, and these were all associated with operations in the curved portion of the canal.

Among the inferences to be drawn from the foregoing cases and remarks are, first, that Stricture may be present before difficulty in urinating occurs; second, that it is always present when *gleet* is present, (*gleet, as a rule, means Stricture*) third, that dilatation of Stricture is, at best, but a temporary expedient, valuable in close Stricture, where urination is interfered with, and when the Stricture is too close for the introduction of instruments for completely dividing it. Fourth, that dilatation is not only without permanent value, except in such cases, but that *it is pernicious*, because while never curative, it takes the place of curative measures; that nothing short of complete division of Stricture can ever result in radical cure.

CHAPTER V.

RETROSPECT.

THE direct attacks upon important and time-honored teachings which are contained in the foregoing papers failed to elicit any response, either in this country or in Europe, notwithstanding that they were reprinted in pamphlet form, and freely distributed at home and abroad.

The common sense of the profession, however, did not fail to appreciate the position of authorities who claimed a fixed standard for the size of the human male urethra. This error, exploded hopelessly by the urethra-metre, and the average size raised from the old estimate of 21 mm. French to 32 mm. (with extremes 28 and 40), the importance of Strictures of large calibre began to be appreciated. Though the journals were silent the instrument-makers were at work. Dilating urethrotomes — of various patterns — bulbous sounds from 8 mm. to 40, urethra-metres, etc., found ready sale. Soon, by the force of a common sense mechanical view of the subject as opposed to baseless conventional dogmas, the operation of dilating urethrotomy ceased to be a novelty, and surgeons began to contemplate the possibility of Stricture of 30 F. (or more) in a urethra of 40 mm. without a sneer, almost without a smile.

The first published intimation, however, that the profession had begun to indorse the claims of a greater normal calibre for the urethra now appeared in the volume on "Genito-urinary Diseases, with Syphilis," by Van Buren and Keyes, New York, 1874, where, on page 28, they say, "The *diameter of the urethra varies even more than its length.* It has been estimated at from two to six lines" (that is to say from 13 to 40 millimetres), and—in italics—"*A fair average well-formed adult urethra measures about three-eighths of an inch in diameter.*" This

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THE direct attacks upon important and time-honored teachings which are contained in the foregoing papers failed to elicit any response, either in this country or in Europe, notwithstanding that they were reprinted in pamphlet form, and freely distributed at home and abroad.

The common sense of the profession, however, did not fail to appreciate the position of authorities who claimed a fixed standard for the size of the human male urethra. This error, exploded hopelessly by the urethra-metre, and the average size raised from the old estimate of 21 mm. French to 32 mm. (with extremes 28 and 40), the importance of Strictures of large calibre began to be appreciated. Though the journals were silent the instrument-makers were at work. Dilating urethrotomes — of various patterns — bulbous sounds from 8 mm. to 40, urethra-metres, etc., found ready sale. Soon, by the force of a common sense mechanical view of the subject as opposed to baseless conventional dogmas, the operation of dilating urethrotomy ceased to be a novelty, and surgeons began to contemplate the possibility of Stricture of 30 F. (or more) in a urethra of 40 mm. without a sneer, almost without a smile.

The first published intimation, however, that the profession had begun to indorse the claims of a greater normal calibre for the urethra now appeared in the volume on "Genito-urinary Diseases, with Syphilis," by Van Buren and Keyes, New York, 1874, where, on page 28, they say, "The *diameter of the urethra varies even more than its length.* It has been estimated at from two to six lines" (that is to say from 13 to 40 millimetres), and—in italics—"*A fair average well-formed adult urethra measures about three-eighths of an inch in diameter.*" This

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is equal to 30 mm. in circumference. The importance of *recognizing and treating Strictures of large calibre* was first publicly indorsed by the same authorities, on page 149 of their work entitled, "*On Strictures of large calibre*," where they say: "*The majority of Strictures which the surgeon is called upon to treat are of large calibre. The symptom of which the patient complains, is persistent gleet, following gonorrhœa, or bastard gonorrhœa, with possibly some frequency in urination. These cases are of daily occurrence, and often pass unrecognized, the gleet being treated, the Stricture overlooked. Too much stress cannot be laid upon the importance of exploring the urethra, in such cases of gleet, with the bulbous bougie.*"

The first authoritative indorsement of my *Dilating Urethrotome* may be found on page 123 of this work by Drs. Van Buren and Keyes, thus, "Several instruments have been recently devised to cut Strictures of *large calibre*. Such, for *instance, as have been dilated, but are somewhat resilient, and cannot be farther effaced by dilating instruments;* or *indeed, to cut any Stricture after first having put it upon the stretch, an idea first successfully carried out by Reybard. Perhaps the most useful of these is Otis's urethrotome for Strictures of large calibre.*" This is accompanied by a wood-cut of one of my earlier instruments (seen on page 123) and a description of the same with directions for its use. And again on page 157, in speaking of Resilient Strictures, "*Many Strictures, however, which respond to dilatation at first, fail to do so after they have reached a certain size. To this class belong all Strictures at or very near the meatus, and many at other portions of the canal. In these latter cases, although a full sized conical sound may readily pass, yet a bulbous bougie, many sizes smaller, introduced immediately after the sound is arrested by the Stricture, while the symptoms (gleet, etc.) fail to disappear entirely.*"* Genito-urinary Diseases with Syphilis, Van Buren and Keyes. D. Appleton & Co., Publishers, New York, 1874.

Early in 1875, Mr. Berkeley Hill of London (Sir Henry Thompson's successor in the University College Hospital,

* See note—concluding paragraph on p. 199.

and to the chair of Clinical Surgery, in the University College), in a clinical lecture on Gleets, published in the London Lancet of February 13th, gives on page 224 the first European endorsement of my teachings, thus: "When there is new tissue, we have really to deal with organic Stricture—a wide Stricture certainly, BUT ONE THAT NEEDS ONLY TIME AND NEGLECT TO BECOME A NARROW AND DANGEROUS CONTRACTION.* An American surgeon, Dr. Otis of New York, has recently contrived a mode of treatment for these indurations which he calls 'Strictures of wide Calibre'† which I have adopted in some cases with success." Then follows a description of the operation, with the wood-cut of a modification of my dilating urethrotome, of which he says, "Here is an instrument made for me (Fig. 3), not exactly a copy of Dr. Otis's, but which performs the same operation in a different way; being the instrument known as Thompson's dilator, only stronger, underneath which a cutting edge is protruded. It is also extremely useful to divide Strictures that are easily dilated, but which rapidly shrink back after the instrument is withdrawn. By keeping the part that is to be cut tightly stretched, the Stricture cannot yield and allow the blade of the knife to pass by without cutting fairly through the narrowing. This is a difficulty not overcome by several otherwise effective urethrotomes."

By reference to the description of my first urethrotome at page 35, it will be seen that the last point made by Mr. Hill is particularly prominent, thus: "The especial advantages claimed for this instrument are that it first makes the Stricture *tense*, thereby establishing it as a fixed point. . . . that it attacks a *tense* instead of a flaccid Stricture," etc., published February, 1872.

The accumulated experience of another year, removed all doubt in my own mind in regard to the radical cure of Strict-

* Capitals my own, F. N. O.

† I have always used the term "Strictures of *large* Calibre." The word *wide* is suggestive of size in a single diameter, whereas *large* implies dimensions in all diameters. F. N. O.

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ure. The crucial re-examination of thirty-one cases, at various periods after operation, up to three years, demonstrating the total disappearance of Stricture in each case, seemed to justify me in the announcement of this fact to the profession (p. 100). I had also found by frequent measurements with the Urethra-metre, that a relative proportion appeared to exist between the circumference of the penis and that of the urethra. The critical comparison of observations in one hundred cases had served to establish this as a fact, which, it seemed to me, must prove of great value to the profession.

Also, through critical measurements in one hundred cases, comprising two hundred and fifty-eight Strictures, I had arrived at conclusions widely different from those of accepted authorities, as to the most frequent seat of Stricture; these measurements proving it to be a rule, with few exceptions, that Strictures were most frequent in the anterior part of the canal. These observations, together with the carefully tabulated results of operations on 203 Strictures in one hundred cases, seemed to me of sufficient importance to warrant their presentation to the profession, which I did in a paper read before the N. Y. State Medical Society in March, 1875, as follows:

On Stricture of the Male Urethra. Its Radical Cure.

In a paper which I had the honor to read before the State Medical Society, in February, 1873, the importance of the recognition and treatment of comparatively slight contractions of the urethral canal, was insisted on. The entire incapacity of all urethral instruments, in general use, to reach such cases, was demonstrated, and a new instrument, one which combined in its operation the principles of dilatation with complete division, was presented. This instrument had been invented but little more than a year, and had been used in operation upon fifty-eight Strictures, occurring in twenty-seven patients. The results, in six cases (comprising eighteen bands of Stricture), had been critically examined by a competent committee of surgeons, at periods varying from one

year to four months after operation. In every case, without exception, the most careful examination with the full-sized bulbous sound had failed to detect the slightest trace of Stricture. In closing my paper I ventured the hope that future experience with this plan of operation on urethral Stricture, by complete division, might be found to result in radical cure. I come before you to-day, gentlemen, with the results of a more extended and intelligent experience, bearing upon this important subject.

My first dilating urethrotome was presented to the profession at a meeting of the Medical Library and Journal Association of New York, November 24, 1871. Up to this time there were no means of efficiently treating Strictures of large calibre. In point of fact, Strictures of the urethra above nine of the English scale, according to English authorities, or twenty-one of the French, according to French authorities, were not considered as requiring treatment. In my paper on Strictures of large calibre, read before the New York Medical Journal and Library Association, in November, 1871, and published in the *New York Medical Journal*, in February, 1872, I claimed, that "the slightest encroachment upon the normal calibre of the urethral canal, at any point in its course, was cause sufficient to prolong an existing urethral discharge, or even to establish it *de novo* without venereal contact." This important proposition, based upon the constant association of Stricture or Strictures, more or less pronounced, with every case of chronic urethritis, and supported by conclusions which the consideration of a persistent mechanical interference with the act of urination rendered inevitable, has found of necessity, practical acceptance by all surgeons who have seriously considered it. As a consequence, a very large class of Strictures of the urethra—by far the largest—once utterly unsuspected and ignored, have come to be recognized as the mechanical cause not alone of urethral discharges, which defied the most persistent and varied treatment by internal remedial measures and injections, but of reflected nervous disturbance, throughout the genito-urinary tract, and even

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extending, in well authenticated cases, to distant parts of the economy.

The term "Stricture" is, of necessity, a purely relative one, and can convey no intelligible idea of its value as a disturbing element, until the calibre of the constricted tube has been ascertained. As long as difficulty of micturition was the earliest recognized evidence of a strictured urethra, considered of any value, and the mechanical obstruction to the passage of urine the only direct result of Stricture, it was perhaps pardonable to neglect the investigation of the exact mechanical relations existing between the Stricture and the urethra in any given case, and to assume a definite standard for the size of all urethræ. In this view of the matter it was perhaps proper to assert, with the French school,* that seven millimetres diameter is the standard size of the normal male urethra, and to claim that this is quite sufficient for the purposes of micturition; or, with the English, that when eight or nine of their scale can be passed through a given urethra, no Stricture can be said to exist;† or with the authors of the American scale,‡ who limit urethral measurements to 31½ m. in circumference. But when it comes to be recognized, as has been proved beyond the possibility of contradiction, that the capacity of the human male urethra bears always a constant relation to the size of the penis with which it is associated, and that this organ varies greatly in size in different individuals, it will be at once seen, that no average standard can be arrived at which will be of practical utility in diagnosis and treatment of Stricture, any more than an average standard can be adopted by the shoemaker for the normal human foot. Nothing is now easier than to prove this statement.

I have said that there exists a constant relation between the size of the flaccid penis and the capacity of the urethral canal. During the past year I have subjected more than one

* Curtis.

† Thompson: Stricture of the Urethra, p. 147. London, 1869.

‡ Van Buren and Keyes, p. 112. New York, 1874.

hundred urethræ to a careful examination on this point, with the following results, to which there has not been found a single exception, viz.:

That, when the circumference of the flaccid penis was 3 inches, the circumference of the urethral canal was found to be at least 30 of the French scale. When it was 3¼ inches the urethra had a capacity of 32. When it was 3½, the capacity would be 34; 3¾ inches = 36; 4 inches = 38. When it was 4¼ to 4½ inches in circumference the capacity of the urethra would equal 40, or more. This will be shown at a glance by the following

TABLE.

TABLE SHOWING THE RELATIVE CIRCUMFERENCE OF THE PENIS AND URETHRA.

CIRCUMFERENCE.	
OF PENIS.	OF URETHRA.
3 inches, or.... 75 mm.	30.....mm.
3¼ " ".... 81 mm.	32.....mm.
3½ " ".... 87 mm.	34.....mm.
3¾ " ".... 93 mm.	36 .....mm.
4 " ".... 100 mm.	38.....mm.
4¼ to 4½ " 106 to 112 mm.	40.....mm.

In every case the urethral calibre was over rather than under the figures above given. In a considerable majority, contraction of the meatus (either congenital or from previous inflammatory changes) was present, and in these cases the measurements were made with the urethra-metre or after division of the contraction. The value of the urethra-metre in ascertaining the actual calibre of the urethra, notwithstanding the presence of Stricture or contraction of the meatus, cannot be overrated; it is with this instrument that the proportionate relations of the urethral calibre and the size of the flaccid

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penis have been confirmed. With it and the metallic bulbous sound, the thorough examination of any presenting urethra may be made, and the precise locality and value of every deviation from its normal calibre be positively determined. Having then, in any given case, made out the number, size, and locality of Strictures, the desideratum is to find an instrument which will completely divide them, with as little injury to the adjacent healthy structures as the possibilities of the case will admit.

URETHRA-METRE.

Stricture tissue is simply cicatricial material, deposited in accordance with the accepted pathological law, that persistent irritation of living tissue results in the aggregation of cells, and the development of connective tissue corpuscles, at the point of irritation, which, becoming organized in the submucous cellular tissue and the adjacent muscular structure of the corpus spongiosum, results in a more or less resilient band or bands always completely surrounding the urethra. We have then always to deal with a resilient band, constricting the urethra more or less, at a given point or points. It may here be urged that Stricture is not always a band surrounding the urethra, but that it may be on one side or the other, or above or below, according to many authorities. To this I answer, that a true Stricture, always and of necessity, completely surrounds the urethra. That it may have its origin, its commencement, at a single point in the circumference is quite evident, but as soon as the calibre of the urethra becomes lessened at any point, the resistance to the flow of urine which it necessarily occasions, and the resulting interference with the harmonious muscular action, produces an irritation in its whole circumference at the point of contraction, resulting sooner or later in an aggregation of fibro-plastic material, not confined to a single

point in its circumference, but around the entire canal; and this fact renders it necessary for us, in all cases of strictured urethræ, to accept the difficulty as one of Stricture, in its true sense, and not of obstruction at a single point. Aside from the evident probabilities in such cases, the fact that Stricture of the urethra may always be released by division at any point in its circumference, would be greatly in favor of this proposition. Practically, then, we may accept the Stricture as constricting the entire canal at some point. We have then a more or less dense, more or less extensive resilient band, or circle, of fibrous tissue, contracting the urethral calibre at one or more points.

Now, if we found a band of any sort of elastic material surrounding the penis, constricting the urethra, even to a very slight extent, the immediate removal of such a band would at once suggest itself as the best method of getting rid of the irritation caused by it. It would not be considered sufficient to put the patient in the best possible condition to bear it, nor to dilate it frequently, with the same idea; the known resilient property of such a constricting band would suggest the transient character of the relief to be expected from such procedure. But one thought should occur to any person in such a case, viz., to divide the band completely at some point. Practically we have an analogous condition of things in every case of urethral Stricture, with the simple difference that the constricting band is resilient fibrous tissue and surrounds the *urethral canal*, contracting its calibre at one or more points, while the intervening portions of the urethra remain equal to or exceeding their normal capacity. The graver consequences of such contractions were recognized at a very early period in the history of surgery, viz., difficulty of micturition, retention of urine more or less complete, urinary abscess and fistulæ; urinary infiltration, causing death, in other cases causing disease of the bladder and kidneys, which proceeded with almost equal certainty, if not with equal celerity, in terminating existence. For the restoration of the urethral calibre, simple mechanical distension promised the easiest and most natural

solution of the difficulty. Thus, bougies and sounds were invented and used at a very early period. The exact point of the contraction, in this method of treatment, it was not necessary to ascertain, as these instruments could be passed through the entire urethra, thus including every point of contraction. As this plan resulted in the temporary relief of a large majority of cases, it came to be considered the method, *par excellence*, to be adopted in all cases of urethral Stricture. After a time, however, it was found that, while, by the use of instruments skilfully graduated from the smallest filiform bougies to a size deemed sufficient to secure the easy performance of micturition, the pressing and threatening troubles resulting from Stricture could be relieved in a large number of cases, there were many, where, from the delay which this method necessitated, and the irritation caused by its use, instead of the relief hoped for, the gravest consequences supervened.

It was then that more immediate and forcible means of relief were devised, such as rupture or division of the constricted points. The divulsors of Perreve, Holt, Thompson, Thebaud and others, and the urethrotomes of Maisonneuve, Civiale, Ricord, etc., came into notice. These were each so successfully used in the hands of different eminent surgeons, that while at first resorted to only when the milder treatment by the different forms of dilatation had proved unsuccessful, advocates arose urging their indiscriminate use in all cases of urethral Stricture. It was claimed that when the strictured urethra was raised to the accepted normal standard by a single blow, there were, on the average, less unfavorable results than where, through a long period, the systematic use of gradual dilatation was resorted to; and besides, that the results of the divulsion and division were of a more permanent character. These claims were stoutly resisted by the advocates of a gradual dilatation, and all the possible benefits and advantages accruing from every other mode of treatment were asserted to be possessed, in superior degree, by their more conservative proceedings. The advocates of immediate

operation are now divided into two classes:—those who believe that all Strictures are best treated by divulsion, and those who claim that the best results are produced only by division of Stricture with some one or other of the various urethrotomes. Each party, however, accepts the necessity of keeping up the results of their operations, by the systematic use of dilating sounds or bougies, for the remaining life-time of the patient. To this complexion do all appear to come at last, the ultimate necessity for continuance of instrumental measures, throughout the life-time of the patient. In this respect, then, whether the plan of treatment for Stricture be that of gradual dilatation, rapid distension, divulsion, or simple urethrotomy, the patient (whatever the surgeon may say) is *never cured*. By each one of these modes life may be saved and much suffering averted.

Thousands, to-day, live in comparative comfort, who, but for the intelligent surgical aid afforded by these instrumental procedures for the relief of urethral Stricture, would be in their graves. Yet the *opprobrium medicorum* rests upon the treatment of Stricture, and why? Because after the patient is pronounced *cured* by his surgeon, he is obliged to continue the systematic use (always repulsive, and often hazardous) of a sound or flexible bougie, for the rest of his life.* Far be it from me to undervalue the skill, the study, and the experience which have brought relief to those under the very shadow of death, nor the teachings that have enabled the least practised surgeon to operate, with fair assurance of a successful issue, out of difficulties, which, twenty years ago would have required a Mott or a Fergusson to combat. I wish to be distinctly understood as appreciating and valuing, to the full, *all* the advances in urethral surgery, and they are many and great, which have been made in Europe and America within the last twenty years. It is not possible for me, however, to accept these as the *ultima thule*, while the patient, *cured* (?) of Stricture, still carries a steel sound in his pocket.

* Wade on Stricture of the Urethra. London, 1860, p. 352.

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I am a believer in the *true curability* of urethral Stricture, notwithstanding that authorities are a unit to the contrary. I think I can bring evidence that will be convincing, that, in the great majority of cases of urethral Stricture, a complete eradication of the trouble is within the reach of every competent surgeon. You are incredulous; you have scarcely patience to listen to such an innovation as a plan for the radical cure of Stricture. If such a plan were possible, why have the many surgeons who have devoted years to the studious investigation of the subject of urethral Stricture, coincided in the unanimous verdict against the curability of Stricture, by any method? Simply, I answer, because there has been a very curious and important oversight in the investigation of the subject, viz:—*The mechanical relations of the Stricture to the urethra have not been considered.* Strictures have been dilated, or rapidly distended, or divulsed or divided, up to a purely imaginary and arbitrary standard. No inquiry has been intelligently instituted to ascertain the natural dimensions of the urethræ examined for Stricture. If the presenting urethra admits No. 9 of the English scale, or 21 of the French, *no* Stricture is present. If the urethra is *below* the accepted standard, Stricture *is* present. After raising the urethral calibre, by any of the methods in vogue, up to what the books lay down as the normal standard, or *what the surgeon thinks is about right*, the Stricture is *cured;* that the patient is not, is his own misfortune. The favorite expression of some surgeons, when concluding the examination of a case which has been systematically treated, cured up to an imaginary point, is, that the size of the urethral canal is "*about right.*" An ancient definition of this term may not be inapplicable in this case—"*Right* is the centre of a circle, and *about right* is the circumference." No such term as "*about right*" can be accepted in such a case; either the urethra *is* of the *calibre that nature furnished*, suited to the patient's own person, *or it is not*. No man, surgeon, or otherwise, can *guess* at this matter. If into a urethra, the normal calibre of which is equal to a circumference of 30mm. of the

French scale, only 29 F. bulbous sound will pass without detecting obstruction, then the urethra is not "*about right.*" It is strictured to the extent of one millimetre in circumference, and can never be a healthy urethra, while that Stricture remains.

Complete freedom from Stricture can only be demonstrated by the easy passage of a bulbous sound of a size fully equal to the normal calibre of the presenting urethra. This is what I alluded to when I stated that the mechanical relations of Stricture to urethral calibre had not been considered. Strictures are dilated, divulsed, or divided, up to an imaginary standard, or what is, if possible, even worse, up to the size of the *meatus urinarius*, and then further operative procedure is turned over to the patient to be continued ever after. Now, if there is any one point more variable and inconsistent with the calibre of the urethra than *the guess* as to its probable size, it is *the opening of the meatus urinarius.* It is more variable, in different individuals, than the length of the prepuce, and bears no constant, or even general relation, to the size of the urethra. In point of fact, besides varying, *congenitally*, more than any other orifice of the body, it is more often strictured from disease than any other portion of the urethra, and yet it is assumed by authorities, as a guide to the normal urethral calibre. How, then, can it excite surprise that no radical cure for Stricture has been found? To warrant the reasonable expectation of cure, the Stricture must be *completely divided* at some one point, and this cannot be with certainty accomplished without a knowledge of the *normal* urethral calibre. The normal calibre once ascertained by means of the urethra-metre, or by measurement of the flaccid penis, the method by which the sundering of the Stricture at some one point is accomplished, may vary, and rest in the judgment of the operator. If dilatation or divulsion be selected as the medium through which to effect this result, the procedure must be carried far enough to *completely* rupture every fibre of the contraction; if division, *every fibre* must be completely severed, or subsequent re-con-

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traction is certain. Neither divulsion alone, nor simple urethrotomy, is capable of effecting this with any certainty. It requires a combination of these two methods to accomplish the desired result. My first dilating urethrotome was constructed for the purpose of meeting these necessary requirements. The results of the use of this, and other instruments involving the same principles, which were reported to your Society in February, 1872, have, as far as could be ascertained, proved permanent. The six cases then cited have each been carefully re-examined, within the last year, by myself and others, without being able to detect a trace of Stricture. One case, that of J. C. (operated on for five Strictures, between December, 1871, and March, 1872), was re-examined, at a meeting of the Medical Library and Journal Association of New York, in June, 1874 (more than two years after the final operation), by a committee of surgeons, consisting of Professor Alfred C. Post, Drs. Miner and De Forrest Woodruff, of New York, who reported complete absence of even a trace of Stricture.

Since my report of the above-mentioned cases to your Society, I have operated on a very large number of Strictures, with various instruments, but chiefly, and latterly almost solely, (except in Strictures at the meatus) with the dilating urethrotomes. One hundred cases of urethral Strictures, comprising two hundred and three operations, upon two hundred and fifty-eight Strictures, have been carefully collated, from my books of daily record, by my assistant, Dr. J. Fuhs, and subjected to a subsequent critical revision by myself.

The careful tabular analysis of these cases, which is presented with this paper, embraces the following points: 1. Age of patient. 2. Cause of Stricture. 3. Locality and size. 4. Number in each case. 5. Normal calibre of urethra. 6. Complicating diseases or conditions at date of operation. 7. Symptoms at date of operation. 8. Accidents following operation. 9. Results of operation, as determined by a subsequent re-examination with the full-sized bulbous sound, at periods varying from three weeks to three years. 10. Results as shown by continued relief from all symptoms, where no instrumental re-examination has been practicable. Not to absorb too much of the valuable time of this Society, I will only allude now to a few points of greatest importance in connection with the facts which are developed by this summary:

1st. It will be found that out of the 258 Strictures, 52 were in the first quarter inch of the urethra; 63 in the following inch, viz., from ¼ to 1¼; 48 from 1¼ to 2¼; 48 from 2¼ to 3¼; 19 from 3¼ to 4¼; 14 from 4¼ to 5¼; 8 from 5¼ to 6¼; 6 from 6¼ to 7¼.

Authorities claim that the great majority of urethral Strictures is found in the vicinity of the bulbo-membranous junction, and cite various possible causes for their frequency in this locality.

By the above statement it will be seen that they occur, as would naturally be expected, in greatest frequency where the inflammation begins the earliest, and rages the hottest, and gradually diminish in frequency in the deeper portions of the canal.

2d. The normal calibre of the urethra is shown for 100 cases in the following table:

22	Mm.	circumference	in.....	1	36	Mm. circumference	in..... 1
28	"	"	"	3	37	" "	" 2
29	"	"	"	1	38	" "	" 6
30	"	"	"	18	40	" "	" 1
31	"	"	"	25	Not noted.....		" 4
32	"	"	"	19			
33	"	"	"	3			Total.... 100
34	"	"	"	16			

Thus, it will be seen that in ninety-six carefully measured cases, the *average* normal calibre was 31.84; but omitting the case of child of ten years, whose urethral calibre was 22mm., the average for the remaining cases is nearly 32mm.

3d. Of the accidents following operations: Hæmorrhage in four cases; prostatic abscess in three cases; curvature of penis during erection in three cases; urethritis in two cases;

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diphtheritic deposit on wound in three cases; urethral fever in seven cases; retention in one case.

In a small proportion of cases hæmorrhage has been quite profuse; not during or immediately following the operative procedure, but coming on after urination, or more commonly, during erection. Especially from the latter cause, it is sometimes sudden, and copious, but readily controlled. The fact that hæmorrhage, of any moment, *ever* occurs (although in the one hundred cases cited there were only four), leads me to use, and to advise, such precautionary measures, in *all* cases, as will give complete security against harm from this accident. My usual plan is to have an intelligent attendant instructed to watch the patient during sleep (when erections are most likely to occur), and to make prompt pressure of the penis at the incised locality. This is usually sufficient to arrest the flow. Applications of ice are also of value for the

same purpose. In some cases I have found it necessary to introduce a tube into the urethra, making pressure upon it by means of a light bandage, and to have it retained until the hæmorrhagic tendency has passed.

An ordinary endoscopic tube answers well in such cases. Division of Strictures, at or near the meatus, is most likely to be followed by hæmorrhage. Here a shorter tube will suffice. When the bleeding is from the vicinity of the meatus, it results from the division of a small artery near the frenum. When in the deeper portions of the urethra, it arises, probably, from incision into the trabecular spaces. In either case, the danger of recurrence is not entirely over before the fourth or fifth day.

4th. Slight urethral fever has followed the operation but seven times. Six times, when for Stricture in the curved portion of the urethra; once only, when the operations were

in the pendulous portion of the organ, and this occurred in a malarious subject. This leads me to remark, that, in my experience, operations confined to the pendulous urethra, are as a rule, *never followed by constitutional disturbance*, even when six or seven Strictures are divided at the same sitting. But, to insure this result, no instrument, not even a sound for exploratory purposes, should be passed into the bladder, during, or immediately subsequent to the operation.

5th. Three operations were followed by prostatic abscess. In one of these cases, the patient, who was a physician, sailed for the West Indies in about a week after the operation (which was for a single Stricture near the meatus), and reported trouble of the prostate coming on soon after, he meanwhile, using a sound himself, to prevent recontraction, and each time passing the instrument through the prostatic urethra.

In the second case the patient, who was accompanied by his physician, left my care three days after operation, and one week after reaching home (during which a sound was passed into the bladder every day or two), the prostatic trouble came on, which ended in abscess. In the third case, the patient, who had been operated on for five Strictures, of a very dense character, passed from my observation immediately after the operation. Prostatic trouble came on insidiously during the next ten days, while the sound was being occasionally passed to prevent recontraction. I will not criticise, nor attempt to explain, the causes which led to the prostatic trouble in these cases. I recognize the fact, that *the simple introduction of a sound, through the deep urethra, even with the utmost skill and care, may, of itself, give rise to an irritation which may terminate in abscess of the prostate.* But I will state that no such accident has befallen any case which has remained under my own personal care until healing of the wound has taken place.

6th. Curvature of the penis downward followed in three cases where numerous Strictures were divided, but this trouble occurring during erections was unattended with pain

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and passed off entirely within from two to six months after the operation, in two cases. In one case, at the end of a year, there was slight curvature, but it gave no trouble, and subsequently disappeared.

7th. Urethritis in two cases; one followed an operation at the meatus, being set up by forcible use of a tube, by the patient, to prevent recontraction. It lasted acutely for three weeks, and was followed by a gleet, lasting four months, which finally ceased after a second operation, required by the recontraction which had taken place. The third followed an operation upon four Strictures, and occurred within a week. This was complicated by the presence of a diphtheritic deposit, upon the wound, near the meatus, probably resulting from a similar action in the wound of the deeper portions of the canal.

8th. Diphtheritic deposit occurred upon the wound, in two other cases, lasting, under treatment by iron and quinine generally, and applications of the strong acetic acid locally, about two weeks, and was followed, in both instances, by a recontraction of the Stricture.

Thirty-one cases were re-examined, and found cured, no recontraction having taken place.

TABLE.

Time after operation.	No. of Cases.	No. of Strictures.	Time after operation.	No. of Cases.	No. of Strictures.
3 years	1	4	5 months	1	7
2½ "	1	7	4 "	1	3
1½ year	2	8	3 "	4	15
13 months	3	14	2½ "	1	10
1 year	4	7	2 "	4	11
10 months	1	2	1 month	1	1
9 "	1	1	3 weeks	1	5
8 "	1	1	2 "	1	1
7 "	2	10			
6 "	7	21		37	128

In thirty-one cases none of the Strictures had recontracted. In six cases most of them had been absorbed, while some remained.

RESULTS IN 100 CASES.

Cures. Re-examined. No recontraction	31 cases.
Cure. Patient perfectly well when last heard from. No re-examination	52 "
Perfect relief for a length of time. Return of symptoms. Re-examination. Stricture found to have recontracted	4 "
Perfect relief for a length of time. Return of symptoms. No re-examination	5 "
Relief of most symptoms. Some remaining. Patient still under treatment	4 "
Partial relief	3 "
Result not known	1 case.

It will be seen from these statistics that the results of treatment justify in the completest manner all that has been heretofore claimed by me for the method. In point of gravity it will be seen that cutting operations for the division of Stricture in the pendulous portion of the urethra (where the great majority of Strictures are found), compare most favorably with all other modes of treating Stricture, and cannot be considered as exposing the patient to more peril or inconvenience than simple gradual dilatation by means of graduated soft bougies or sounds. In regard to the advantages of operations as quoted, they are manifold, to the patient as well as to the surgeon. They are comparatively painless, except near the meatus, and speedily performed, involving at most but a few days loss of time (often not even a day, where the Stricture is single and recent). The after treatment consists only of separation of the wound throughout its extent by the easy passage of a full-sized steel sound daily, or every other day, until healing is complete. If by this time no other Stricture is discovered, the patient may be dismissed as cured. Sometimes, however, after the division of a single Stricture other bands of larger calibre in the vicinity, which had been so stretched during the operation that they eluded detection, may be found. But this will always be ascertained within the few days which suffice for the tissues to recover from the dilatation consequent upon the operation. In such cases these

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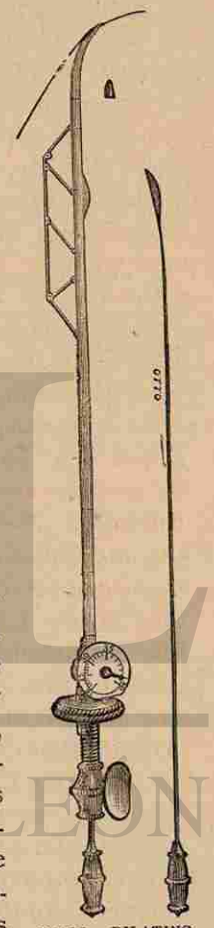
bands must be divided in the same manner as the first. *Absolute division of all bands which in the least contract the canal is necessary for complete immunity from after trouble.* Failure in obtaining perfect freedom in the passage of a full-sized bulb is due to the imperfection of the means used, and not to any fault in the method.

In certain long-standing, dense, fibrous Strictures, I have sometimes experienced great difficulty in effecting their thorough division, and this is especially the case in regard to Strictures caused by masturbation, or by traumatism. I have occasionally had to use several different kinds of cutting and dilating instruments before the desired object was effected. No one instrument can ever be depended on to succeed, completely, in all cases. In ordinary Strictures what I term my improved dilating urethrotome, will be found the most easy of management, and is, as a rule, thoroughly effective. It is constructed with a dilating apparatus, and when closed is in size equal to about 20 of the French scale. Upon its superior aspect, a blade, guarded at the top, is slid down through a groove to the end of the shaft, (after the manner of the urethrotome of M. Maisonneuve,) possibly nicking the smaller Strictures in its passage. The screw at the handle is then slowly turned until the hand on the dial indicates that the instrument is dilated up to two or three millimetres *beyond* the previously ascertained normal calibre of the canal. The blade is then slowly withdrawn, cutting through all the Strictures on the superior wall of the urethra. The strain of the dilatation falling almost solely on the Strictures, they are thus made the most salient points, receiving the anterior edge of the blade, while the normal portions of the canal are protected completely, or nearly so, by the guard on the top of the knife. In this way the division of the Strictures is accomplished with the least possible injury to the mucous membrane covering the sound portions of the urethra. The instrument is then withdrawn, and an examination for results is instituted with a full-sized bulb. If any fibres of Stricture are then detected, the operation must be repeated, at the

contracted point, until perfect freedom to the passage of the bulb is secured.

For a second operation, I not unfrequently use one of my earlier urethrotomes,* which cut only at a single predetermined point, and the blades of which are not protected by a guard. In all these instruments the incisions are comparatively slight. The tension to which the Strictures are subjected renders them thin, and brings them into condition to be completely severed by an incision of the least possible depth. Cutting always upon the superior wall of the urethra and in the median line, hæmorrhage is usually slight, and ceases almost immediately. In all cases of Stricture, *at or near the meatus*, I am accustomed to make the division on the *inferior* wall of the canal, and very thoroughly, with a straight bulb-pointed bistoury. The utmost freedom to the passage of the bulbous sound must here be insisted on, and not a single trace of contraction left uncut. The after-treatment of this class of Strictures requires much more care to prevent recontraction than those in the deeper parts of the urethra. Every possible means must be used, such as rest, cold water applications, etc., to prevent inflammation; otherwise a recontraction is liable to occur. The *very least* return of obstruction is often sufficient to prevent the cessation of the gleet or of the reflex troubles, for the cure of which this operation is usually performed.



SMALL DILATING URETHROTOME.

* The dilating urethrotomes are known to the makers (Messrs. Tiemann & Co., No. 67 Chatham Street, and Messrs. Otto & Sons, 64 Chatham Street), as Nos. 1. 2, 3, 4, in the order of their invention—Nos. 1 and 2 dilating and cutting at a single predetermined point, while Nos. 3 and 4 dilate the entire canal. Each has

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As a means of avoiding inflammatory action after operations upon the penis, I am in the habit of insisting upon a constant application of cold water by means of a small India-rubber tube, arranged so as to encircle the penis, and through

BULB POINTED BISTOURY.

which water of any desired temperature is carried by syphonic action.* The healing process is thus facilitated; painful erections (which sometimes follow operations upon the pendulous urethra), are allayed, and the chances of urethritis avoided. By proper arrangement of the vessels containing the water the patient can use the cold water coil while in bed, or when sitting, or the water bottles may be so arranged in an upper and a lower pocket, that the patient may, if necessary, even walk about and attend to pressing business without removing it.

advantages which cannot be combined in the other, but either one will answer in all cases of single Stricture. When several Strictures are present, especially if close together, the latter numbers are to be preferred. No. 4 has the advantage of being adapted to any Stricture in the straight urethra without distending the curved portion of the canal.

* The apparatus which I have designated the "Cold Water Coil" is formed of a line of the small-sized India-rubber tubing of one-sixteenth of an inch calibre, and six or seven yards in length. At the middle portion this tubing is coiled upon itself, so that, by half a dozen turns or more, it presents sufficient capacity to loosely encircle the entire penis or scrotum.

This coil, with the length of tubing proceeding from it forms an apparatus through which, on placing one extremity of the tubing in a bowl or tumbler of ice water, exhausting its contained air (by suction, or by drawing the tube through the finger), a syphonic current is established through the coil. The discharge pipe being placed on a lower plane than the water supply, the current may be kept up until the vessel is emptied.

The rapidity of the flow can be regulated either by raising or lowering the end of either tube, which is the simpler plan, but the more convenient one is by a tapering, double silver tube, attached to the discharge pipe, a sponge being fitted to the inner tube. This sponge, when the inner tube is pushed down into the smaller end of the outer tube, becomes compressed, and gradually obstructs the flow of water, until not a drop will exude. This contrivance may be regulated so that either a free stream can pass, or that the single drops shall follow each other, more or less rapidly, with the regularity and precision of a time-piece.

The above directions refer entirely to operations within the pendulous urethra. Surgical operations in the curved portion of the canal demand rest in bed, until the healing process is complete.

SOLID SOUND SHORT CURVE.

In none of the cases above reported has any dilatation been attempted after the healing of the wound made during the operation. The use of sounds subsequent to the operations, is simply to separate the cut surfaces, and not for purposes of dilatation, and their use is discontinued as soon as a full-sized bulb can be passed through and beyond the previous site of Stricture, and withdrawn without a trace of blood accompanying or following the use of the instrument.

Recontraction of Stricture, after operation, is simply due to incomplete division, and this will, as a rule, be detected within one week, or at most two weeks, by which time stricture tissue distended—not divided—will sufficiently recontract to become readily recognizable by the full-sized bulb. If, then, no Stricture can be recognized, the cure of the difficulty may be considered *complete*, and no further treatment, will be required.

Strictures of a calibre of less than 16 or 18 of the French scale (7 or 9 of the English), require enlargement by gradual dilatation with soft bougies when this is well borne, if not, by divulsion, or by the urethrotome of M. Maisonneuve. After having been brought, by any one of the methods above referred to, up to a capacity permitting the passage of the dilating urethrotome, complete division of the Strictures by means of this instrument may be readily effected.

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STATISTICAL TABLES OF ONE HUNDRED CASES OF URETHRAL STRICTURE TREATED BY INTERNAL URETHROTOMY.

Number of Case.	Age.	Cause and date of	Number of Strictures.	Locality of Stricture.	Size of Strictures.	Norm. Calib. of Urethra.	Condition at date of Operation.	Complications.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.
1	60	Congenital contraction.	1	⅓ in.	24	38	Frequent and painful micturition. Pain in penis, scrotum, perineum, abdomen. Urine purulent and mixed with blood.	Cystitis, small calculus in bladder.	2		Relief from all trouble. Recontraction. Second operation. Relief up to date.	
2	38	Gonorrhœa fifteen years ago. Several times since. Last attack four years ago.	3	½ in. 2 in. 2½ in.	28 28 28	34	Gleet. Pain in urethra, scrotum, thighs, knees, legs, feet, groins. Painful movements of the testicles.	Gleet.	1		Immediate relief, following operation. Recurrence of symptoms reported. No re-examination.	
3	32	Gonorrhœa ten years ago.	1	Meat.	22	31	Gleet.	Gleet.	1		Cure in six weeks.	
4	54	Gonorrhœa twenty eight and eight years ago.	3	½ in. 1 in. 2 in.	20 24 28	31	Frequent micturition. Pain in urethra, perineum, scrotum and thighs Urine purulent and mixed with blood.	Retention repeated by gravel.	2		Immediate relief Cure of reflex symptoms.	
5	68	Gonorrhœa forty-seven and forty years previously.	1	Meat 2¾ in.	29 29	32	Gleet. Lumbar and perineal pain. Frequent micturition.	Gleet. Cystitis. Enlarged Epidymis.	2		Immediate relief and cure in one month.	
6	54	Gonorrhœa	1	1 in.	29	34	Gleet.	Gleet.	1		Cure, complete in two weeks.	Thirteen months after operation no recontraction.
7	33	Gonorrhœa several times during the last ten years.	1	½ in.	33	33	Gleet for five years	Gleet.	1		Cure in two weeks. Perfectly well one month after operation.	One month after operation no recontraction.
8	27	Gonorrhœa seven years previous.	3	3½ in. 1 in. 1¾ in.	20 19 19	31	Frequent and painful micturition. Pain in perineum	Enlarged prostate.	3		Cure	Three months after last operation. No recontraction. Perfectly well
9	24	Gonorrhœa	1	Meat.	20	32	Gleet. Irritation in urethra	Gleet.	1		Cure	One year after operation No recontraction.
10	30	Gonorrhœa four years previous.	9	½ in. 1 in. 1½ in. 2½ in. 3 in. 3½ in. 4 in. 4½ in 5½ in.	23 28 28 30 30 30 28 28 28	37	Frequent micturition. Gleet	Gleet.	3		Slight gleety discharge remaining ten days after operation. Not since heard from.	
11	37	Gonorrhœa nine years ago.	1	Meat.	23		Granular spots in urethra. Painful erections.	Painful erections.	1		Granular spots disappeared after operation. Painful erections still persist.	
12	--	Gonorrhœa twelve years previous.	2	½ in 2½ in.	26 26	34	Pain in perineum, left hip over the region of left kidney.	Redundent prepuce. Circumcision.	1		Immediate relief of pain in perineum, hip and back.	
13	46	Gonorrhœa twenty years previous.	1	Meat	22	31	Frequent micturition. Imperfect erections.	Imperfect erections.	1		Cure	One year after operation. No recontraction. Sexual power perfect.

STATISTICAL TABLES—*Continued.*

Number of Case.	Age.	Cause and date of	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calib. of Urethra.	Condition at date of Operation.	Complications.	Number of Operations.	Accidents after Operation.	Results.	Re-examinations.
14	45	Gonorrhœa fifteen years previous. Several times since.	1	1¼ in.	30	32	Gleet for twelve and a half years.	Gleet	1		Cure of gleet in one month	
15	42	Congenital contraction.	1	⅛ in.		34	Irritability of vesical neck. Imperfect erections.	Imperfect erections.	4	Hemorrhage controlled by tube.	Cure. Recontraction three times. Perfectly well two and a half months after last operation.	
16		Gonorrhœa four months previous	1	Meat.	21	32	Gleet	Gleet	1		Cure. No re-examination after one month	
17	24	Masturbation	5	Meat. 1½ in. 2¼ in. 2¾ in. 3¼ in.	18 29 24 23 23	32	Frequent micturition	Weekly seminal emissions.	2	Curvature of penis during erections.	Cure of all trouble	Seven months after operation no trace of stricture.
18	25	Gonorrhœa one half a year previous.	1	½ in.	20	34	Frequent and painful micturition. Pain in perineum. Gleet.	Gleet	5		Cure. Four re-contractions with partial return of symptoms. Final cure after last operation ten months ago.	
19	48	Gonorrhœa twenty years previous.	1	Meat.	22	31	Frequemt seminal emissions. Incomplete erections.	Frequent seminal emissions. Imperfect erections.	1		Cure	

20	25	Gonorrhœa three years previous.	2	1⅛ in. 6 in.	23 21	31	Gleet lasting one year	Gleet	1		Cure of gleet. Deep stricture not divided.	
21	25	Gonorrhœa one and a half and one year previous.	4	2 in. 4⅛ in. 4¾ in. 5 in.	24 24 24 24	30	Gleet	Gleet	2		Cure	Ten months also two and three years after operation. No recontraction.
22	20	Gonorrhœa. Masturbation.	2	⅛ in. 1½ in.	24 24	30	Gleet	Gleet	2		Cure. Remains perfectly well two years and three months after last operation.	One year after operation no recontraction.
23	30	Gonorrhœa ten years previous.	3	¾ in. 2½ in. 3½ in	31 31 31	31	Gleet	Gleet	2		Cure	
24	50	Gonorrhœa thirty and twenty-five years previous.	1	⅛ in.	18	29	Painful and frequent micturition. Gleet.	Gleet	2		Cure. Recontraction after six months. Second operation. Relief, which after two years remains permanent.	
25	54	Gonorrhœa	2	½ in. 3 in.	16 26	31	Irritability of vesical neck. Gleet.	Gleet	2		Cure, which remains complete three years after last operation.	
26	40	Gonorrhœa twelve years previous.	5	⅛ in. 2 in. 2¼ in. 2½ in. 2¾ in	20 28 28 28 28	31	Frequent and painful micturition.		2	Chills	Cure	Six months after last operation, no recontraction.
27	35	Masturbation	4	Meat. ½ in. 1 in. 2 in.	19 19 27 27	31	Chronic discharge from the urethra.	Gleet	2		Discharge disappeared	Recontraction at meatus. None of deep strictures.
28	17	Masturbation	3	⅛ in. 2 in. 3¼ in.	20 22 22	32	Frequent and painful micturition.		2	Prostatic abscess.	Cure	Four mos after operation. No recontraction.
29	40	Gonorrhœa three years previous.	1	¼ in.	36	38	Frequent micturition. Sense of foreign body just behind the meatus, causing great nervousness. Gleet.	Gleet	1		Cure within two weeks	Nine months after operation. No recontraction.

STATISTICAL TABLES—*Continued.*

Number of case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Strictures.	Norm. Calibre of Urethra	Condition at Date of Operation.	Complications.	Number of Operations.	Accidents after Operation.	Results.	Re-examinations.
30	19	Gonorrhœa two years previous.	7	1 in. 2¼ in. 3 in. 3½ in. 3¾ in. 4 in. 5½ in.	25 31 26 22 31 31 27	31	Frequent and painful micturition. Repeated urethral chills, caused by attempted dilatation. Gleet.	Gleet	1	Chills	Cure	Five months after operation. No recontraction. Perfectly well at date, January, 1875.
31	19	Masturbation	1	¼ in.	26	32	Frequent and painful micturition. pain in perineum, glans penis, thighs, testicles, nervousness.		2		Relief for three months. Return of symptoms. Recontraction discovered. Second operation. Partial return of symptoms four months after.	
32	24	Gonorrhœa	2	Meat. 2 in.	29 29	31	Gleet	Gleet. Spasmodic stricture at seven inches.	1	Prostatic abscess.	Immediate relief of spasmodic stricture, under other care Pros. abscess reported ten days after.	
33	25	Gonorrhœa six years ago. Frequently since.	1	½ in.	22	32	Gleet for four years	Gleet	1		Cure	Two mos. after operation. No recontraction.
34	29	Gonorrhœa six months previous	5	½ in. 3 in. 3½ in. 3½ in. 4½ in.	24 25 24 26 29		Gleet. Vesical tenesmus.	Cystitis, gleet, pleurisy, with effusion. Aggravation of symptoms from diuretics.	1		Immediate relief of all symptoms connected with the urinary organs. Tolerance of diuretics re-established.	
35	46	Gonorrhœa	1	¼ in.	19	31	Frequent and painful micturition. Pain in shoulders, knees, legs. Painful erections.	Painful erections.	4		Recontraction of stricture three times. Last operation about a month ago. Perfect relief after each operation, until recontraction occurred.	
36	38	Gonorrhœa six years previous.	2	in. 2 in.	26 30	32	Painful micturition. Gleet.	Gleet. Spasmodic stricture.	1		Cure of troubles within a month. Gleet, etc.	
37	41	Gonorrhœa six years previous.	2	Meat. 1 in.	24 24	30	Gleet. Unpleasant sensation in testicles.	Gleet	1		Cure of gleet and the nervous trouble in testicles.	
38	47	Gonorrhœa twelve years previous.	1	¼ in.	28	32	Frequent micturition. Irritation in deep urethra. Had been treated for deep stricture.		1		Cure. 32 passes with ease into the bladder after division of the meatus. No re examination after two weeks.	Re-examined two weeks after operation. No recontraction.
39	28	Gonorrhœa six and five years previous.	5	Meat. 1 in. 1¾ in. 2 in. 2¾ in.	22 31 31 31 31	34	Frequent and painful micturition. Gleet. Weakness.	Gleet	2	Diphtheritic exudation on surface of wound at meatus after first operation	Cure of gleet and frequent micturation.	Three months after operation recontraction at meatus. No trace of deep strictures.
40	28	Gonorrhœa seven years previous.	1	¼ in.	30	34	Gleet	Gleet	2		Cure of gleet for one month. when patient aquired a fresh gonorrhœa.	
41	29	Gonorrhœa	5	Meat. 2¼ in. 3¼ in 4¼ in. Memb. port.	9 9 9 9 8	32	Frequent and painful micturition. Gleet. Frequent attacks of retention of urine.	Gleet. Retention of urine.	1	Urethral fever Hæmorrhage, causing retention and necessitating perineal incision and aspiration of the bladder.	Recovery with thirty f. calibre. To continue use of sound as recontraction at some point had taken place. Further operation deferred.	Recontraction slight after one month.

STATISTICAL TABLES.—*Continued.*

Number of Case.	Age.	Cause and date of.	Number of Strictures.	Locality of Stricture.	Size of Strictures.	Norm. Calib. of Urethra	Condition at date of Operation.	Complications.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.
42	39	Masturbation.....	1	¼ in.	28	32	Frequent painful micturition. Pain in thighs, knees and legs.	Frequent seminal emissions.	1	----------	Immediate relief of all reflex troubles. Cessation of seminal emissions for one month. Return of trouble. No re-examination.	----------
43	57	Follicular ulceration.	3	From Meat to 1 in.		32	Frequent and painful erections. Very severe pains in thighs and feet. Extreme sensitiveness of glans penis.	Urethral fistula. Urinary abscess over right crus penis.	2	----------	Cure. Immediate relief following operation. Urinary abscess healed in ten days. Perfectly well four months after operation. No re-examination.	----------
				2½ in.	26							
				2¾ in.	23							
44	24	Masturbation.....	1	½ in.	28	34	Excessive sensitiveness of glans.	Freq'ent seminal emissions. Premature discharge of seminal fluid	1	----------	Cure of sensitiveness of glans, and consequent relief of seminal trouble.	----------
45	32	Gonorrhœa six years previous.	1	Meat..	23	31	Frequent micturition.....	Retention of urine repeatedly. Spasmodic stricture at membranous portion.	1	----------	Cure. Perfectly well four months after operation.	----------
46	21	Gonorrhœa three and a half years and also two months previous	5	Meat..	26	36	Gleet	Gleet	1	----------	Cure of gleet within two weeks. Re-examination three weeks after operation. No recontraction.	Three weeks after operation. No recontraction.
				¼ in.	26							
				2 in.	26							
				2¾ in.	26							
				1 in.	30							
47	28	Gonorrhœa six years previous.	7	Meat..	22	32	Gleet, lasting six years....	Gleet	4	----------	Cure.....	One and two and a half years after operation. No recontraction.
				1 in.	22							
				2 in.	30							
				2½ in.	30							
				1½ in.	30							
				4 in	30							
				4½ in.	30							
48	25	Gonorrhœa ten and also seven years previous.	5	⅜ in.	20	28	Gleet for seven years	Gleet	3	Hemorr'age controll'd by tube.	Cure.....	Seven months after operation. No recontraction.
				1¼ in.	20							
				1½ in.	20							
				3 in.	27							
				4 in.	27							
49	--	Gonorrhœa five years previous.	4	Meat..	23	32	Gleet	Gleet	4	----------	Cure.....	Three months after last operation. No re-contraction.
				2¼ in.	26							
				2½ in.	30							
				3 in.	31							
50	--	Gonorrhœa twelve years previous.	1	Meat..	22	32	Gleet	Gleet. Frequent erections. Urinary sinus near meatus.	3	----------	Cure of gleet. Sinuses healed. No re-examination.	----------
51	62	Gonorrhœa forty-one years previous.	2	Meat..	28	33	Frequent micturition.....	Spasmodic stricture at membranous portion, dilated for twenty yrs.	1	----------	Immediate relief followed operation. Intervals between micturition, eight hours. One month after operation, relief permanent. No recontraction.	----------
				2 in.	30							
52	72	Masturbation.....	3	Meat.	28	34	Frequent micturition, followed by severe pain in back and soreness in urethra.	Weekly seminal emissions. Priapism.	1	----------	Relieved from frequent micturition and priapism for about three weeks. Return of trouble. No re-examination.	----------
				2½ in.	28							
				3¼ in.	28							

STATISTICAL TABLES—*Continued.*

Number of case.	Age.	Cause and date of	Number of Strictures.	Locality of Strictures.	Size of Strictures.	Norm. Calib. of Urethra.	Condition at date of Operation.	Complications.	Number of Operations.	Accidents after Operation.	Results.	Re-examinations.
53	25	Gonorrhœa ten years previous.	5	1½ in. 3 b'nds 4½ in. 2 b'nds	20 27	30	Gleet. Irritable bladder	Gleet	2		Cure	Re-examined thirteen months after operation cure still perfect.
54	--	Gonorrhœa	8	Meat. 2¼ in. 2½ in. 2¾ in. 3 in. 3¼ in. 4¼ in. 5 in.	22 22 26 24 30 30 24 24	31	Gleet	Gleet	5	Chills (slight). Curvature of penis during erection.	Cure	Thirteen months after last operation. No re contraction.
55	--	Gonorrhœa two and also one and a half years previous.	3	2⅜ in. 3¼ in 2¼ in.	29 27 27	30	Gleet	Gleet	5	Hemorrhage not very severe. Controled by tube.	Cure	One year after last operation no re-contraction.
56	--	Gonorrhœa five and two years previous.	1	⅝ in.	24	30	Gleet	Gleet	2		Cure	Half a year after last operation no gleet no re-contraction.

57	23	Gonorrhœa one year previous.	10	Meat. ¾ in. 1 in. 1¼ in. 1½ in. 1¾ in. 2 in 2½ in. 3½ in. 4½ in.	24 22 31 22 31 40 33 37 37 37	40	Gleet	Gleet	8		Cure of gleet. No re-contraction at any point after six months. Contracted another gonorrhœa.	Six months after last operation no re-contraction.
58	30	Gonorrhœa	2	Meat. 2½ in.	21 18	30	Pain and uneasiness in perineum and glans penis.	Great nervousness.	3		Freedom from symptoms following each operation. and continuing from one to two months.	
59	27	Gonorrhœa	1	Meat..	24	30	Gleet. Profuse purulent discharge, caused by intercourse.	Gleet. Spasmodic stricture at membranous portion.	1		Cure, remaining complete one year after the operation.	Six months after the operation no recontraction.
60	32	Gonorrhœa ten years previous Masturbation.	1	Meat...	22	30	Gleet.	Frequent seminal emissions. Nervousness Gleet.	1		Cure of gleet within two weeks. Married at the end of one month. Re-examined two months after. No return of trouble.	Two months after operation. No recontraction.
61	40	Gonorrhœa twelve years previous.	1	⅓ in	26	30	Frequeav micturition. Pain in penis. Gleet.	Gleet. Intense pain following seminal emissions.	2		Cure. Relief of pain and frequent micturition. Cessation of discharge for three months, when it returned, and also the frequent micturition. Recontraction found. Second operation followed by renewed relief, which continued for six months when he contracted a fresh gonorrhœa.	

STATISTICAL TABLES.—*Continued.*

Number of Case.	Age.	Cause and date of.	Number of Strictures.	Locality of Strictures.	Size of Strictures.	Norm. Calib. of Urethra.	Condition at date of Operation.	Complications.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.
62	45	Gonorrnœa twice	1	Meat...	28	38	Irritability of bladder. Pain after connection.	Spasmodic stricture at membranous portion	2	----------	Immediate relief. Recontraction after two months. Return of trouble. Second operation followed by relief, which was permanent six months after operation.	Six months after operation. No recontraction.
63	34	----------	1	⅓ in.	15	34	Pain in back, hypogastrium, groins, testicles, inner aspect of thighs and knees	Double hydrocele. Frequent seminal emissions.	3	----------	Immediate relief of pains. Disappearance of hydrocele within a month. Two recontractions with return of Symptoms Third operation followed by relief, which continues one year after operation	----------
64	50	Gonorrhœa twenty five years previous.	1	½ in.	18	30	Irritability of bladder. Gleet for five years.	Gleet----------	2	----------	Cure; return of symptoms five months after first operation.	Two and a half years after second operation, remains perfectly well
65	37	Masturbation ----	4	Meat. 1 in. 3 in. 3½ in.	30 34 34 34	38	Constant desire to urinate. Burning in penis. Pain at meatus, in back hypogastrium, right testicle and legs.	No erections; no venereal desire for four months	1	Diphtheritic exudation. Acute urethritis	Relief of pains. Patient still under treatment three weeks after operation.	----------
66	59	Gonorrhœa first twenty-nine years previous. Several attacks since.	4	¼ in. 1¾ in. 3½ in. 4½ in.	20 20 20 15	34	Frequent and painful micturition. Stranguary. Pain in perineum, above pubes and in groins.	Cystitis----------	4	----------	Immediate relief of pains and stranguary. Pus in urine diminished. Frequent micturition persists. Still under treatment.	----------
67	47	Gonorrhœa twenty five years previous.	2	⅓ in two bands.	28	32	Frequent and painful micturition. Small stream.	----------	1	----------	Cure----------	Two months after operation, no recontraction.
68	51	Gonorrhœa twenty years previous.	1	Meat.	21	34	Micturition every hour ----	Loss of sexual power.	1	Diphtheritic deposit.	Immediate relief of frequent micturition. Recurrence of erections Patient still under treatment.	----------
69	52	Gonorrhœa ----------	2	3½ in. 5½ in.	fil fil	--	Frequent micturition. Pus in urine.	Subpubic and perineal fistulæ.	1	----------	Relief of symptoms----------	----------
70	31	Gonnorrhœa four times; last attack three years previous.	3	Meat. 2 in. deep.	-- -- fil	30	Difficult micturition. Blood in urine. Urine in drops. Pain in back.	----------	2	----------	Cure of symptoms. No re-examination.	----------
71	35	Gonorrhœa----------	1	½ in.	25	34	Gonorrhœa acute for five months.	Gonorrhœa--	2	----------	Immediate relief to acute symptoms. Still under treatment.	----------
72	32	Gonorrhœa seven years previous. Several times since.	2	Meat. 3 in.	34 19	38	Gleet ----------	Gleet ----------	2	----------	Relief of discharge. Slight recontraction after one month.	Recontraction after one month.
73	29	Gonorrhœa three months previous.	2	⅓ in. 2¼ in.	26 29	30	Gleet ----------	Gleet. Spasmodic stricture.	3	----------	Relief of spasmodic stricture. Slight discharge remains.	Recontraction at meatus. None of deep stricture.
74	28	Paraphimosis Occidental.	4	1½ in. 2⅛ in. 2⅜ in. 2⅝ in.	16 21 21 21	31	Gleet ----------	Retention of urine. Gleet.	3	----------	Relief of symptoms----------	Three months after operation found contraction at three inches.

STATISTICAL TABLES—*Continued.*

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Strictures.	Size of Strictures.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complications.	Number of Operations.	Accidents after Operation.	Results.	Re-examinations.
75	40	Gonorrhœa seven years previous.	1	Meat.	28	32	Difficult micturition, followed by pain in urethra. Gleet.	Gleet	1		Cure	
76	29	Gonorrhœa two years, also two months previous.	1	⅛ in.	26	31	Burning in urethra during micturition. Pain in back. Gleet.	Gleet	1		Cure	
77	38	Gonorrhœa thirteen years previous.	1	Meat.	24	33	Frequent micturition. Pain in deep urethra and testicles. Nervous feeling in thighs and legs. Burning of hands and feet.		4		Cure	
78	54	Gonorrhœa fourteen years previous.	2	3½ in 6 in.	26 fil	--	Frequent and painful micturition.		1	Chills	Perfect relief	
79	40	Gonorrhœa twelve and also one yr. previous.	1	⅓ in.	21	34	Frequent and painful micturition. Pain at glans penis. Purulent urine. Burning in urethra during seminal emissions.		4		Cure	
80	40	Use of syringe to prevent gonorrhœa.	1	Meat.	22	30	Frequent micturition		1		Relieved of frequent micturition for two years. Return of same trouble. Recontraction found. To be operated on again.	Recontraction found after two years.
81	43	Gonorrhœa repeatedly.	1	½ in.	20	28	Frequent and painful micturition.	Cystitis. Follicular infiltration of urine into the perineum Deep, spasmodic stricture.	1		Division of meatus and incision into perineal abscess, followed by immediate relief of symptoms Cure of cystitis in two weeks without other treatment. No subsequent re-examination.	
82	35	Gonorrhœa fifteen years ago. Several attacks since. Use of powerful injection.	3	½ in. 2 in. 2½ in.	28 28 28	31	Pain in groins extending to feet. Peculiar motion of testicles, causing great suffering.	Peculiar movements of testicles, causing great suffering.	2		Reflex movements ceased after operation, also pains. Eight months after operation return of trouble. No re-examination.	
83	51	Congenital contraction.	1	Meat.	20	30	Frequent micturition		3	Urethritis, followed by gleet, lasting 4 months.	Perfect relief for one year. Return of symptoms. Second operation followed by urethritis and gleet. Third operation followed by complete relief, which after eighteen months remains perfect.	
84	54	Gonorrhœa twenty and also eight years previous.	3	¾ in. 1½ in. 2½ in.	20 24 28	31	Frequent and painful micturition. Pain in penis, testicles, thighs, perineum. Long attacks of retention of urine. Gleet. Chronic cystitis.	Cystitis. Gleet. Gravel. Retention of urine previously.	2		Cure. One month after first operation, re-contraction. Re-division of stricture at meatus. Relief. Perfectly well three months after, as reported by his physician.	
85	--	Gonorrhœa five months previous.	1	Meat.	16	30	Gleet	Gleet	2		Cure	

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86	22	Gonorrhœa five years previous.	3	$\frac{1}{3}$ in. $2\frac{1}{4}$ in. $2\frac{3}{4}$ in.	24 24 24	31	Occasional increased frequency of micturition.	Redundent prepuce Circumcision.	1	----------	Gleet ceased for six months. Then he had a fresh gonorrhœa, followed by gleet.	Six months after operation re-contraction at meatus. None of deeper strictures.
87	47	Gonorrhœa twenty and three years previous.	1	$\frac{1}{2}$ in.	22	28	Return of gleet after each venereal indulgence.	Gleet	1	----------	Cure. No return of trouble six months, also one year after operation.	----------
88	28	Gonorrhœa	2	Meat. 2 in.	24 24	31	Gleet for two years	Gleet	1	----------	Cure of gleet. No return when patient was seen last.	----------
89	30	Gonorrhœa ten years previous.	1	$\frac{1}{2}$ in. 3 in.	17 17	34	Gleet	Gleet	3	Gonorrhœal rheumatism.	Cessation of gleet for three months. Recontraction at three inches and return of discharge. Still under treatment.	Recontraction at three inches six months after operation.
90	45	Gonorrhœa twenty years previous.	2	Meat.	22	34	Several attacks of retention of urine. Treated for deep stricture. Trouble referred to neck of bladder.	Spasm. Stricture. Retention of urine.	1	Prostatic abscess.	Complete relief. After division of meatus thirty-four sound passed into bladder. Passed out of observation one week after operation.	----------
91	47	Gonorrhœa twenty five years previous.	2	$\frac{1}{3}$ in. two bands.	28	37	Frequent micturition. Granular urethra and great sensitiveness of urethra.	Granular urethra.	1	----------	Cure. Immediate relief to frequent micturition. Urethral trouble disappeared without further treatment.	----------
92	34	Gonorrhœa ten years previous.	1	$\frac{1}{2}$ in.	27	31	Frequent micturition. Sense of fullness in urethra. Highly spasmodic condition of urethra.	----------	1	----------	Cure of frequent micturition and abnormal sensations in urethra	----------
93	47	Gonorrhœa twenty years previous.	7	Meat. 1 in. $3\frac{1}{2}$ in. four bands. membr portion filifo'm	24 22 15	31	Frequent micturition. Two attacks of retention of urine. Small stream.	Retention of urine.	1	Chills	Relief of all symptoms which continues.	Two months after the operation no recontraction.
94	10	Balanitis	1	Meat.	12	22	Incontinence. Frequent micturition.	Phymosis circumcision.	2	----------	Cure. Immediate relief of incontinence. Return of incontinence. Recontraction. Redivision of meatus. Perfect relief of incontinence up to date.	Three months after last operation.
95	50	Gonorrhœa twenty years previous.	2	$\frac{1}{2}$ in. $2\frac{1}{4}$ in.	27 30	32	Frequent micturition. Pain and tenderness in hypogastrium and back. Small stream. Dribbling.	----------	1	----------	Immediate relief of symptoms, which continues up to date.	----------
96	27	Masturbation	1	Meat.	30	38	Frequent micturition. Sense of wetness about glans. Dribbling.	Frequent seminal emissions.	3	----------	Cure. Remains perfectly well eight months after last operation. Recontraction with return of symptoms twice.	Eight months after last operation no recontraction.
97	27	Gonorrhœa seven years ago. Several attacks subsequently.	2	$\frac{1}{4}$ in. 1 in	20 19	31	Frequent and painful micturition. Pain in penis, perineum, rectum. Constant desire to defecate.	Postatic enlargement.	2	----------	Cure. Relief of all symptoms for two months. Recontraction with return of symptoms Second operation followed by relief, which after ten months remains perfect.	Ten months after last operation, no recontraction.

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98	33	Gonorrhœa thirteen years previous.	14	Meat..	22	30	Gleet. Retention of urine. Urine in drops.	Gleet. Retention.	2	Chills after introduction of instrum'ts.	Complete relief of symptoms. External and internal operations combined.	Recontraction of two strictures to 24.
				1 in.	19							
				2 in	15							
				3 in.	10							
				3 to 4½ in 6 bands	8							
				4½ to 6¼ in 2bds	1							
				6¼ to 7½ in 3bds	⅓							
99	30	Gonorrhœa	8	¾ in.	--	31	Gleet for two years	Gleet	3	Curvature of penis during erection. Disappeared after one year.	Cure of gleet	One year and a half after operation, no re contraction, except at two points, between three and four ins.
				1¼ in 3bds	27							
				3½ in.	25							
				2 in.	26							
				2½ in.	26							
				3¾ to 4								
100	30	Gonorrhœa ten years previous.	2	Meat..	--	30	Frequent and painful micturition. Gleet.	Gleet	2		Cure	One year and a half after last operation, no recontraction.
				6½ in.	17							

Total number of operations, 203

CHAPTER VI.

ITINERARY.

ABOUT three months after the presentation of the foregoing paper to the State Medical Society, I made a voyage to Europe with my family, stopping incidentally in London. Not hitherto satisfied with the mechanism of the urethrametre I availed myself of the exceptional skill of Messrs. Mayer & Meltzer, Surgical Cutlers to the University Hospital College of London, to substitute steel springs for the jointed arms. By this improvement the instrument was rendered more valuable through increased accuracy and freedom from points of friction. The dilating urethrotome was also improved at that time, concealing the blade by dropping it into a groove at the end of the instrument.

Presenting a letter to Mr. Berkeley Hill, from my friend Dr. Bumstead, I was cordially received. I soon found that Mr. Hill was *au courant* with my published views and in general harmony with them. By his invitation, on the 7th of July, 1875, I delivered a clinical lecture at the University College Hospital, embodying my peculiar views on urethral Stricture with practical demonstration, before a large body of students and medical men. A report of this lecture, by the late M. Victor de Meric, may be found in the London Lancet of July 24th, 1875.

I called upon Sir Henry Thompson, author of several works on genito-urinary diseases, and perhaps the greatest accepted living authority on all such matters. My previous published criticism of his teachings on urethral Stricture, (p. 69, *et sequitur*,) while purely impersonal and scientific, did not lead me to expect a cordial acceptance of my views. They

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				1¼ in 3bds	27							
				3½ in.	25							
				2 in.	26							
				2½ in.	26							
				3¾ to 4								
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were made the subject of some discussion, however, and subsequently I was afforded an opportunity, through his polite invitation, of witnessing several operations by him, on Stricture, and for vesical calculi, on private patients. The results of the Stricture operations as well as of the discussions which followed them were not productive of a satisfactory settlement of the grave points of difference which were known to exist between us.

Through the courtesy of Mr. Alfred Cooper, Mr. Walter Coulson and Mr. W. F. Teevan, eminent surgeons in London, and connected with the Lock Hospital and St. Peter's Hospital for stone, I operated on several cases of urethral Stricture and demonstrated the capacity of my different instruments in each of those hospitals, and in each case operated on, the proportionate correspondence between the urethral calibre and the circumference of the flaccid penis was proved. One case was met in Mr. Coulson's service at the Lock Hospital, where the circumference of the flaccid penis was 10.6 centimetres (4¼ inches). After the division of an anterior contraction, I passed a solid steel sound, No. 40 F. through the entire urethra without the least force. This instrument was withdrawn by Mr. Coulson, who then expressed his conviction that the normal portions of this canal had not been *over-distended* by the introduction of the sound No. 40, i. e., of a circumference of 40 mm."

Another case (in St. Peter's Hospital) in the service of Mr. Coulson, was subsequently published in the London Lancet of August 28th, 1875, page 305, under the title of PERINEAL SECTION FOLLOWED BY THE OPERATION OF DR. OTIS FOR THE CURE OF FISTULA IN THE PERINÆUM, by Walter Coulson, F. R. C. S., Surgeon to the Lock and St. Peter's Hospitals, is here quoted from the *Lancet*.

"The following case considerably abridged, may serve as an introduction to some remarks on perineal fistulæ and on the operation for Stricture, proposed by Dr. Otis of New York, and recently performed in this country.

"Case is that of Robert D., aged forty-four, seaman. About

five years previous to his admission, for the second time, into hospital, he had been treated as an in-patient by dilatation at Grey's Hospital. Two years ago (1873,) he was admitted with extravasation of urine, following retention. This condition was relieved by free incision of the perinæum. The patient made a good recovery, but a perineal fistula remained, which it was hoped might be closed by continuing the dilatation of the Stricture. At the time of his leaving the hospital a No. 5 English (12 French) catheter could be passed into the bladder; but the man neglected to attend as an out-patient, and when re-admitted, in May, 1875, he was unable to pass any urine naturally, the whole of it escaping in a small stream, through the perineal fistula. The passage of the urine now causes great pain and scalding, which continue for some time after micturition; he suffers from constant desire to micturate, the urethra is exceedingly sensitive, the urine loaded with mucus and pus, and no instrument can be passed into the bladder. Up to the 17th of May, several attempts had been made to pass elastic instruments into the bladder, by the penis, and through the perineal opening, but they failed. He has been taking fifteen minims of sandal oil three times daily, which has materially diminished the muco-purulent deposit in the urine, but has had no effect in diminishing the scalding. On two occasions he had retention of urine which was relieved, after some difficulty, by insinuating a small elastic instrument through the fistulous opening into the bladder, but all attempts to pass an instrument along the penis, from the meatus, were unavailing. However, an extremely fine elastic bougie could be passed along the penis and out at the perineal opening. On May 17th, I performed the following operation. A No. 8 (E.) steel bougie was passed down along the urethra, as near to the fistula as the thickened structures surrounding it would permit. A free incision was then made through the fistulous opening, and the adjacent strictured portion of the urethra was freely divided. A straight grooved director was then passed through the wound into the bladder, the edges of the fistula were pared

and a No. 16 French elastic catheter was introduced into the bladder, the straight director acting as a guide. The catheter was tied into the bladder and retained there until the following evening.

"No bad symptoms followed the operation, and the temperature of the patient remained unchanged. From this date until July 19th, both continuous and occasional dilatation was employed, and the edges of the wound were touched from time to time with caustic. The perineal wound became merely a fissured opening, but still it would not quite heal, and on every occasion that the patient passed water some portion of the urine escaped through the fistula. *The question then presented itself, whether the fistula might not possibly be kept patent by some constriction in the penile portion of the urethra.* With the assistance of Dr. Otis an examination was made with the urethra-metre, *and the existence of three distinct points of Stricture was demonstrated.* It was therefore resolved that resort should be had to his operation. The patient was placed under the influence of ether administered by Dr. Knott, and the urethrotome of Dr. Otis was passed down as far as the fistula. The instrument was then made to indicate a dilatation corresponding to 32 of the French scale, and the three points of contraction were freely divided. The last mentioned result was verified by the introduction of the bulbous sound (32) which was passed down as far as the fistulous opening, and withdrawn without a catch. A tube open at both ends and about five inches long, was tied into the urethra after the operation, and was allowed to remain for six hours. This was at the suggestion of Dr. Otis, but the tube was removed, at the patient's request, as there was no sign of bleeding; the loss of blood after the operation was also slight. From the date of the operation, July 19th to the 24th, no unfavorable symptom manifested itself. A 32 bougie was daily passed along the urethra to prevent adhesion of the cut surfaces, *and the patient left the hospital cured.* When he reported himself to me August, 16th, *the fistula was completely healed.*"

Mr. Coulson then follows with a description of my instruments and modes of operation, with an explanation of my views and the results claimed. In concluding he says: "Amongst the complications arising from Stricture, extravasation of urine, and injury to the urethra, there are few which occasion more inconvenience to the patient, and trouble to the surgeon than perineal fistula. In D.'s case, the complication resulted from an operation performed for the relief of extravasation, and, dilatation having been tried and failing to close the fistula, perineal section was for a second time resorted to; but in spite of this operation, and subsequent dilatation, the fistula remained open.

"The result of Dr. Otis's operation certainly proved that slight contractions, which are not usually recognized as Strictures, may offer obstruction to the passage of the urine sufficient to prevent a urinary fistula from healing. The result of the internal division of the Strictures and the daily introduction of full-sized instruments left the mucous wall of the canal, after complete cicatrization had taken place, as supple and non-resisting to the passage of the full-sized sound, as a perfectly healthy urethra."

In order to prove the results above shown by Mr. Coulson, I will introduce in this connection a case published in the British Medical Journal of October 21st, 1876, as related by Mr. W. F. Teevan, Surgeon to the Lock and St. Peter's Hospitals, London, being an extract from the proceedings of the Clinical Society of London, as follows:

"*Traumatic Stricture and numerous penile fistulæ cured by internal urethrotomy.*" Mr. Teevan related particulars of the case. The patient was a sailor who had injured his scrotum and penis by a fall twenty-one years previously. Numerous abscesses formed and sixteen fistulæ resulted, through which all the urine was passed. In the course of a few years the fistulæ in the scrotum (eleven in number) closed, but those in the penile urethra remained open. For a period of more

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than three months Mr. Teevan tried three separate plans of treatment, with but partial success. 1st. Retaining a catheter in the bladder. 2d. The patient drawing off all his own urine with a catheter for two months. 3d. The application of heated wires and probes tipped with the nitrate of silver. On January 6th Mr. Teevan performed Dr. Otis's operation, and *nine days afterward all the fistulæ were closed* and remained so permanently. The points of interest in the case were,

1st. The Stricture being a traumatic one, of the worst description.

2d. The fistulæ being in the penile urethra, always most difficult to cure.

3d. The fistulæ having been open for the long period of twenty-one years.

4th. The failure of three different methods of treatment.

5th. The permanent closure of the fistulæ after the Strictured portion of the canal had been enlarged by Dr. Otis's urethrotome *to its natural calibre* which was 31 m. in circumference.

6th. Subsequent to the operation no catheter was left in the bladder, nor was the urine drawn off."

Through the courtesy of Mr. Joseph Lister, F. R. C. S., then Professor of Clinical Surgery of the University of Edinburgh, and Mr. Annandale, F. R. C. S., Lecturer on Clinical Surgery, of the University of Edinburgh, I was enabled to present my views on urethral surgery before the British Medical Association at the meeting in Edinburgh, August 5th, 1875, in an address which was published in the British Medical Journal, February 26th, 1876.

Two complete and beautifully finished sets of my urethral instruments, manufactured within a fortnight after my arrival in London, by Messrs. Mayer & Meltzer, were placed on exhibition by them in the Surgical Instrument Hall of the Association, at the meeting of August, 1875.

Later in the season, September, 1875, passing through

Paris, I loaned my instruments to M. Collin, successor to M Charriere, Surgical instrument-maker, who duplicated them for the benefit of the profession there. My time however was so limited that I could not then bring them the instruments, with my views and experience personally before the surgeons of that city, distinguished in the history of Genito-urinary surgery.

On my return to the United States early in October, 1875, I found a greatly increased interest among surgeons in the views which for the previous five years I had persistently advocated in societies, in the journals, in my hospital services, and in my Clinical Chair in the College of Physicians and Surgeons. All the various hospitals had been provided with my instruments, and dilating urethrotomy for the cure of gleet and Stricture was beginning to be generally practised.

Gleet, in its relations to urethral Stricture, was becoming a matter of interest to the profession at large, and I was requested to write an article embodying my views as definitely as possible on the subject for the series of American Clinical Lectures, edited by Dr. E. Seguin, and published by Putnam's Sons, of New York. This was written at once and published in October, 1875. Inasmuch as it became the subject of subsequent important public discussion, it is thought desirable in this place to reproduce it entire, as follows:

Gleet, and its relations to urethral Stricture.

"The secretion of the urethral mucous membrane serves as a protector, and lubricant, for the preservation of this membrane from contact with the irritating urinary fluid. It is made up of germinal granules—particles of bioplasm (Beale), which rise up through the interstices of the sub mucous cellular tissue,* are transuded through the basement mucous membrane, and becomes organized as the protective and lubricative epithelial cells of the urethral mucuous membrane; and where the conditions of its evolution are in every respect perfect, in quantity just sufficient for the lubrication and protection of this structure. This is never sufficient to

* Rindfleisch, Pathological Histology, Am. Ed. pp. 43, 99, *et seq.*

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be perceptible to the naked eye, except as a moist glazing of the surface. Any excess is always the result of an abnormal stimulation of the natural processes, except in a single instance, purely physiological, when it proceeds from an erotic excitement, and appears at the urethral orifice as a transparent mucous exudation, which passes off with a cessation of the nervous impression which provoked it. The causes which unduly increase the secretion of this membrane (and in speaking of the urethral mucous membrane, I include the glands, crypts, and follicles, made up of its local reduplications), are to be divided into two classes:—first, active inflammation set up by contagion, or clap; and second, mechanical injury or obstruction, such as urethritis, from lodgment of calculus, or injuries caused by irritant injections, or instrumental violence, or from urethral Stricture.

The first effect of an approaching inflammation of mucous membrane is an increase in the natural secretion. The mucous cells are hurried along, through their different stages of development, and, as the amount of secretion increases, it is less and less perfectly elaborated; the germinal material is drawn to the surface with increasing rapidity, until cells, which, in health, pass through a gradual development, from the germinal granule to the fully formed epithelial scale, now appear as a mass of emasculated corpuscles—*pus cells*, which constitute what we are accustomed to designate as a purulent discharge.

The inflammation is thus characterized, during its continuance, whether arising from contagion or from mechanical or traumatic causes. The character of inflammation in the urethral mucous membrane varies in *degree*, rather than in *kind*. Its products are, to all appearance, similar, whether the result of gonorrhœal contagion, or from injury caused through instrumental or mechanical interference alone. The duration of the inflammation varies, as the cause is more or less vicious in its onset, or more or less persistent in its influence. An inflammation set up by a gonorrhœal contact will continue, in spite of the most efficient and judicious treatment, for several weeks, while the inflammation caused by the forcible introduction of a sound through a narrow meatus urinarius, *may* subside in a few days, and yet circumstances, *wholly unconnected with contagion*, may elevate this latter discharge, from a purely traumatic inflammatory product, so that it may communicate a disease to a perfectly healthy individual, in no way distinguishable from a gonorrhœal inflammation.

An inflammation, set up by contact with pus, from an acknowledged gonorrhœa, *at once* partakes of the vicious, contagious character of the inflammatory products from which it was derived. A simple urethritis *may* continue simple, and recovery take place within a short period, or it *may* be aggravated by various influences, such as vinous or sexual excess, contact with uterine or vaginal secretions, prolonged physical exercise, or from simple mechanical irritation, in a strumous or gouty diathesis, until it shall have *acquired* the property of contagiousness. Arrived at that point, urethritis of non-venereal origin, does not differ in any way from that which has been originally acquired by contagion. The *contagium*, or contagious element present in gonorrhœal inflammation, would seem to be due to an acquired viciousness, from the fact, that this *contagium* may be developed, or induced, in simple urethritis, by the various causes above enumerated, independently of contact with the gonorrhœal secretion. This position, *most important in practice, as well as in a medico-legal point of view*, is capable of substantiation by eminent authority, and besides, I have personal knowledge of its truth, from a number of carefully observed and recorded cases. The active stage of an inflammation of the urethral mucous membrane is called an *urethritis*, when resulting from causes independent of venereal contact, and when referable to a contagious origin, it is termed a *gonorrhœa*. Its duration in the great majority of cases, may be set down as four or five weeks. In the cases where complete recovery does not take place within this time, there is usually a subsidence of the more acute symptoms, and the case is then characterized by a painless or nearly painless discharge, more

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or less profuse, and more or less purulent, which persists, in spite of the most earnest and judicious treatment by internal and local remedies, for weeks, perhaps months—often years; at times reduced to a mere secretion, which sticks the lips of the meatus together, when, upon a slight indiscretion in diet, a little sexual or vinous indulgence, within a few hours it may return as a free, and possibly painful purulent discharge. This chronic form of urethritis, which has, from time immemorial, afflicted humanity, and which has probably been the source of more trouble, to patients and surgeons, than any other known difficulty, is familiarly known as GLEET.

It is usually considered either as a sort of chronic gonorrhœa, and treated on the same general principles (by internal remedies, and local injections), or is looked upon as the result of a debilitation of the urethral mucous membrane but having no specific or contagious property associated with it, and is treated by specific and local means, with the addition of some constitutional remedies addressed to the condition or diathesis upon which the continuance of the difficulty is supposed to depend. Now, if it can be established that gleet is the result of a *mechanical* condition, that it may be produced, without the previous occurrence of a gonorrhœa, by a simple obstruction to the free discharge of urine through the urethra, and that this obstruction may occur as a result of *any* inflammation or injury which shall implicate the sub-mucous urethral tissues, it will then be clear that no treatment which is not based upon the detection and removal of the mechanical difficulty can be more than palliative. And if it can be shown that the detection of *contraction* is possible *in all cases of gleet*, and that its removal *is certain* to result in the cure of the gleet, the proof of the non-specific character of gleet may be considered established.*

Mr. Henry Dick of London, whose brochure on the "Pathology and Treatment of Gleet,"† is in my opinion, the most valuable contribution to the literature of this subject in any language, says "Gleet is always the consequence of a

* See page 139. † Published by Baillière Bros., in 1858.

clap. I have never seen it idiopathically appear without clap, except in cases of disease of the prostate gland or the bladder. I would not say that idiopathic gleet never exists, but I have never seen it." This statement conveys the impression which is generally accepted by the profession in regard to the cause of gleet.

Acute urethritis, from whatever cause, may be stated as a self-limited disease;—a disease which, under various methods of treatment by internal remedies, such as copaiba, cubebs, sandal oil, etc., by alkalies and diuretics of various kinds, by local injections, such as sulphate of copper, sulphate of zinc, acetate of copper, acetate of zinc, acetate of lead, nitrate of silver, any and all of the mineral salts or vegetable astringents, preparations of carbolic acid, liquid glass (silicate of soda), fuller's earth, or any one of the thousand injections which have been used and lauded for their curative influence on acute urethritis—or by no treatment at all,—has a tendency to get well within a limited time, and that time may be stated to be about four weeks. Dr. Bumstead* formulates the experience of the profession, past and present, in the statement that the average duration of the disease is '*three or four weeks.*' "*Greater success on the average,*" says Dr. Bumstead, "*is probably not attainable by any means with which we are at present acquainted.*" I have met quite a number of well authenticated cases, where there was a history of a severe gonorrhœa with inflammatory complications, which recovered within this time, under the use of *baths alone;*—others, where homœopathic treatment was resorted to; and others again, where *no treatment at all* was had, and where recovery came within the four weeks. Now, while I am sure that a variety of remedies, local and general, may, when judiciously employed, enable the patient to pass through the disease with much more comfort, and less danger of subsequent trouble, than without treatment, yet I am quite prepared to state as my opinion, based upon a large personal experience in the treatment of this disease by the most ap-

* Bumstead on Venereal Diseases, Phil., 1870, p. 92.

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proved methods, *that it is a self-limited disease in its acute form*, and, when it lasts longer than four weeks, or when apparent recovery takes place, and the discharge breaks out afresh without new exposure, that *there is a complication present* either the result of the current inflammatory trouble, or of some inflammation antecedent to the attack, which causes the continuance of the trouble, and which must be appreciated and removed before any *permanent* cure can be had. This complication is URETHRAL STRICTURE—Stricture in the sense of an abnormal contraction of the urethral calibre, at some point at or between the meatus urinarius and the bulbo-membranous junction; and I will furthermore state it as my conviction, that the continuance of the inflammatory trouble (and whenever there is an urethral discharge there is incontestibly more or less inflammatory trouble) is due to the irritation kept up by the arrest, more or less complete, of the stream of urine at the point of Stricture, and by the imperfect emptying of the urethra after urination. *Chronic gonorrhœa—Gleet*—also variously designated as prostatic, gouty, scrofulous, is dependent, as a rule, on abnormal contractions of the urethral canal. The only exception that I recognize (aside from the presence of polypoid, or warty growths in the urethra) is the engagement of urethral sinuses (as the lacuna magna, or some one of those occasionally met near the meatus, possibly deeper down), and these I have never found engaged, unless more or less co-arctation at an anterior point was also present. *Chronic urethral discharge means Stricture.* I am quite aware, that well-defined Stricture may be present, without a palpable discharge, but there is always to be found evidence of a certain degree of irritation present in all such cases, although there may be no appreciable discharge. When, however, there is *discharge*, there will, in every case, be found, if the examination is efficiently made, a *well-defined* and *unmistakable* point of *Stricture*.

The dependence of continued inflammation in gonorrhœa, and of the continuance of chronic urethral discharge, upon the presence of Stricture, is no new discovery. All the recent

approved authorities recognize it. Dick was the first, so far as I know, to insist upon a thorough examination of the urethra for obstruction in every case of gleet, and his instructions for the examination of the urethra with the bulbous bougie of Le Roy d'Etiolles are minute and complete. Sir Henry Thompson says in his work on Stricture of the Urethra, page 90: "I have known instances in which this symptom (gleet) has been so prominent that the patient has been treated for a gonorrhœa, during a period of many weeks, without suspicion arising that a Stricture existed, which was its sole cause; the subsequent recognition of the contraction and its cure having been attended with the complete cessation of the discharge."

Dr. Bumstead (Bumstead on Venereal Diseases, 1870, p. 93,) says: "It is not impossible that there is Stricture of the urethra, *which is the most frequent cause of the continuance of a gleety discharge following an attack of gonorrhœa.*"

Van Buren and Keyes, p. 71, say, "*The most common of all causes for continued gleet is Stricture, already present or forming,*" and yet in spite of the unmistakably pointed and positive statement of these, and other valued authorities, the usual treatment of chronic gonorrhœa and of gleet at the present day, is by *nostrums*, sandal oil, copaiba, urethral injections in multiplicity, and the use of medicated bougies and sounds. And why? It is not that urethral Stricture is doubted as a possible factor in the case; it is not that this is unrecognized as the most *probable* cause of the difficulty; but because the examination of the diseased urethra is conducted with *imperfect instruments*, and that as a consequence, no exhaustive examination of the canal is made. *The least contraction at any point in the urethral canal has been demonstrated as capable of causing the indefinite continuance of an urethral discharge and even of establishing it, de novo, without venereal contact.** If this is the fact, then some means for the detection of the *least* contraction of the urethral canal must be used in order to ascertain the presence or absence of Strict-

* Page 20.

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ure. To this end, the first step must be to ascertain the *normal* urethral calibre in the presenting case. It has been proved that every urethra is an *individuality*, and that no *average standard* is of use in examining a given urethra. The establishment of the normal calibre is the first step towards ascertaining whether or no there be any co-arctations in its

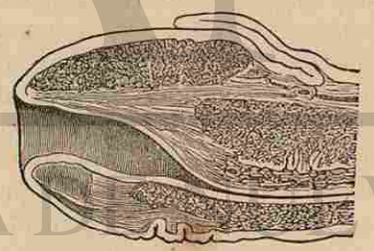
BULBOUS SOUND.

course. This can only be accomplished by *actual measurement* by means of an *urethra-metre*. The proposition is a purely mechanical one. Given a tube, urethral or otherwise, in which it is desirable to ascertain whether or not there exists a contraction of its *calibre* at any point, the first question to settle is *the size of the tube;* this effected, the determination of any *variations* becomes easy; without it, impossible. The bulbous bougie was relied upon by Le Roy d'Étiolles, Dick, and others, many years since, and it has been growing in favor very slowly but surely, so that now it is an indispensable instrument in urethral examination for Stricture. Explorations with an ordinary sound, catheter, or straight bougie, are practically valueless in determining the size, locality, and number of Strictures in a given case. The presence of a contracted meatus (a very common complication, as a result of infantile balanitis or gonorrhœal inflammation) makes the detection of any deeper Stricture, if of greater calibre, quite impossible. The sudden release of a bulbous sound or bougie, of a size which, by firm but gentle pressure, may be made

URETHRA-METRE.

to pass through the meatus, indicates as it slips into the fossa navicularis, that contraction is present at that point; and the relief of the contraction becomes a necessity before

the deeper canal can be efficiently explored, or the normal calibre of the urethra be estimated. It is here that the value of the urethra-metre in the diagnosis of Strictures becomes evident. This should be introduced through the contracted meatus (when this is not below 12 F.), and down to the bulbo-membranous junction. At this point the bulbous portion of the instrument is to be expanded, by means of the screw at the handle, until a feeling of fulness is experienced, when, if there is no Stricture at the point of trial, the pointer on the dial-plate will indicate, with sufficient certainty, the normal calibre of the urethra under examination. Now, drawing the instrument slowly out, if Stricture is present, the bulb will be arrested at that exact point. The screw is then turned, diminishing the size of the bulb, until it slips through the co-arctation, when a glance at the dial will show the calibre of the Stricture. This subtracted from the figures indicating the normal calibre, will give the *precise value* of the contraction. The remainder of the canal, examined in the same way, brings the bulb finally to the meatus, where, in the same manner, the greater or less degree of deviation from the normal size will be shown. Henle* has demonstrated the meatus urinarius to be of uniform size with the fossa navicularis, and thus from an anatomical stand-point, has demolished the error which has been disseminated by so many authorities, and which has achieved so much fictitious importance as a guide in urethral examination, viz., that the *meatus urinarius* is a *measure of the size of the normal canal.*†



VERTICAL SECTION OF ANTERIOR PORTION OF PENIS.

* Handbuch der systematischen Anatomie des Menschen, von Dr. J. Henle, p. 417.

† A constant relation appears to exist between the urethral calibre and the size of the penis with which it is associated. This is a fact demonstrated by careful measurements with the urethra-metre in several hundred cases, without a

What I desire now to make prominent is the fact that the best recognized authorities have long appreciated the value of Stricture as an agent in the prolongation of urethral inflammation and irritation. Whenever it could be demonstrated by the imperfect means used, it was at once accepted as the probable cause of trouble; it was only when no Stricture could be found that the surgeon was driven to the use of internal medication and topical applications. The urethra was vainly explored for Stricture, because the instruments in use were inefficient. The endoscope was the result of an intelligent effort to clear up the diagnosis in cases of gleet, where no Stricture was found. Désormeaux, Cruise and others, discovered the granular spots studding the urethra in such cases, and the secret was apparently manifest. Topical applications through the endoscopic tubes apparently cured some, and gave temporary benefit to many; then an army of young endoscopists followed *en train*, believing, as taught, that the granular sensitive spots in such cases would, if not subjected to frequent ocular inspection and intelligent cauterization, result in true organic Stricture. And yet after months of faithful work in this direction, the return of gleet, without new contagion, made it evident that the true cause of gleet had not yet been reached in such cases. I have the record of at least a dozen instances* where the difficulty was

single exception being met. The proportion runs as follows: When the flaccid penis measures 3 inches in circumference, the size of the urethra will be 30 millimetres in circumference, or more. When it is $3\frac{1}{4}$ inches, it will be 32 or more; $3\frac{1}{2}$ inches, 34; $3\frac{3}{4}$ inches, 36; 4 inches, 38; $4\frac{1}{4}$ to $4\frac{1}{2}$ inches, 40 or more millimetres. Where the urethra-metre is not available, this proportionate relation may be relied upon as not *over-estimating* the *normal* urethral calibre in any case.

* The following is the record of a typical case of this sort:

Mr. W., aged 25, came under my care December 1st, 1872. Contracted first gonorrhœa early in June 1872, was treated by injections locally, and alkalies internally, until August 1st, during which time he had no freedom from the discharge, nor from the acute suffering. At about this time, the vesical neck became involved, and he suffered most from frequent and painful micturition. Came under the care of Dr. ——, a skilled endoscopist, who discovered numerous granular patches in the course of the canal, extending quite into the prostatic portion, and applications of a strong solution of nitrate of silver were made through the endoscope, which afforded temporary relief; urination still painful every hour.

shown to be a Stricture near the meatus, which nevertheless admitted the usual-sized endoscopic tube (22 or thereabouts), and where the dependence of the granular spots upon this condition was proved by their complete disappearance upon the cure of the contraction without the aid of any other treatment whatever. This premises a conclusion arrived at by the experience gained in a very large number of cases, viz., that *gleet is always dependent upon Stricture:* that, while Stricture may be present when there is no gleet, whenever there is a gleet (in the sense of a chronic urethral oozing or discharge), an intelligent and thorough exploration, with suitable instruments, will *invariably* discover a *distinct* contraction of the meatus urinarius, or a *readily recognized* coarctation of the urethra at some point; and further, that the complete restoration of the urethra to its normal calibre and suppleness at the contracted points will be required to warrant the statement that a *permanent cure* has been effected.

The complete division of Stricture has, in my experience, resulted *uniformly* in its complete disappearance within a period varying from three months to one year, and the *cure of gleet has, as a rule, followed the complete division of Strict-*

By September 1st, the discharge decreased to a slight mucus, following the use of pencils of tannin and glycerine. A spell of damp weather brought back the purulent discharge, with return of perineal pain and frequency of micturition. Tannin pencils again used, but after continuing for four weeks, and no improvement, patient was put to bed, and hot hip-baths were administered every two hours, etc., etc. After five weeks of various kinds of treatment, local and general, he came to me from his bed, December 1st, 1872. On examination I found no difficulty in introducing No. 20 F. bulbous sound and discovered a firm cartilaginous Stricture extending from just within the meatus to half an inch back. This I freely cut with Civiale's bistouri caché. Immediately following the operation, he expressed himself as feeling "like a new man." The discharge ceased within twenty-four hours, the perineal pain and frequency of micturition, and the *ardor urinæ* also ceased, and he returned to his duties, which were most active, on the following day, after having been laid up for over five months. *The urethral granulations subsided and finally disappeared within a few weeks without* any local or general treatment. His recovery was absolute and complete, and the only solution afforded was the *division of the Stricture at the meatus*, to which the granular spots in the posterior part of the canal were undoubtedly due.

ure within a period varying from twenty-four hours to four weeks after the final operation.

Let us now consider the various degrees in which gleet is presented to the surgeon.

First. When it is just sufficient to form shreds of inspissated mucus, which are observed on examination of the first washings of the urethra during the act of urination.

Second. When it is in the form of a simple, transparent exudation, only sufficient to glue the lips of the meatus urinarius together, and not even enough to stain the patient's linen.

Third. When, on squeezing the penis and subjecting the meatus to pressure (as patients afflicted with gleet are very much in the habit of doing), a single drop of semi-opaque or creamy purulent fluid may be made to ooze out.

Fourth. When it is met as a thin, profuse, nearly or quite painless discharge, easily reduced in amount by astringent injections, but as readily returning on their withdrawal, and, even if apparently cured, returning promptly on the least vinous or sexual indulgence.

Fifth. When the discharge, thicker, decidedly yellow, and persistently profuse, exudes from an inflamed and pouting meatus, usually causing much redness and irritation upon contact with the preputial tissues.

Each and all the grades or varieties of gleet above enumerated and casually described may, it is believed, be proved to owe their persistence, if not their *ex*istence, to simple, localized, mechanical obstruction to the passage of urine.

The impetus which is given to this fluid during an ordinary micturition is of no insignificant character. The muscles of the diaphragm, abdomen and perinæum combine to bear down, press against, support, and steady the bladder, while the active agents, the detrusor muscles, which interlace over the entire organ, exert an expulsive force sufficient to overcome the resistance of the sphincter vesicæ, and to project the urine in a full, smooth stream through the urethra, to a distance of several feet. This, however, gives

but a faint idea of the effect which a prolonged resistance to the power of the muscular apparatus concerned in emptying the bladder may produce. In order to be fully appreciated, this should be observed in a person laboring under some obstruction to the passage of urine, such as occurs in urethral Stricture. If the Stricture is a slight one it may be apparent only in producing a want of rhythm in the muscular action of the urethra, which prevents a prompt and complete emptying of the canal. Thus it is that *dribbling*, after the act, is occasioned. When the Stricture encroaches to a somewhat greater degree, the stream is no longer full and strong, but becomes twisted, and is projected with less force, and now that the patient often finds himself exerting a pressure of many extra pounds in bearing down upon the bladder, the beginning of the effect of Stricture begins to be realized. But let the case be one where the Stricture has closed the urethral lumen, so that a continuous stream is no longer possible: the pressure becomes so great, that, after a time, not only does the urethra become permanently enlarged behind the Stricture, but the urine is pressed backward from the bladder through the ureters, resulting in dilatation of these delicate tubes to many times their normal size, the pelves of the kidney also participating in this forced dilatation, until a positive sacculation may be produced. This power by which the urine is propelled, certainly furnishes the requisite conditions necessary to establish a point of irritation in a urethra when Stricture is present. It is only necessary to establish the fact that the *normal resiliency* of the urethra is diminished at a given point, to prove that, during micturition, a perturbation in the stream *must* occur at such point, even if it is not sufficient to attract attention in any way. Hence the slightest contractions assume an importance which could not be inferred from the *apparent* freedom from trouble in passing the urine. They establish a localized point of friction, and, of necessity, an increased excitement in the vessels of the part, possibly only enough to disturb the complete elaboration of epithelial material, and to cause the shreddy

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deposit to take the place of the clear normal secretion; and this may occur with very slight, or not even the least abnormal sensation being present. The presence of the mucoid shreds in the urine may be the *only* evidence of commencing trouble. But a permanent point of friction once established, greater than the natural conservative power of the surrounding parts is able to counterbalance, obstruction is increased by the natural aggregation of plastic material at the point of irritation. In this way the tendency to recovery is combated, and a permanent point of inflammatory action is established.

Thus the difficulty, which commenced simply as an obstruction to the resiliency of the urethral walls, progresses naturally and certainly, to the point of narrowing to a greater or less degree the calibre of the urethral canal.

The second point of importance is the incomplete emptying of the urethra after micturition, which occurs as a necessary consequence of anterior contractions. If the muscular structure is embarrassed, its function is imperfectly performed, and instead of completely emptying the canal of its irritating contents, a drop or more is retained, either to dribble away slowly within a few minutes after urination, or to be held behind the contraction by a spasmodic action (always readily set up in the vicinity of urethral irritations) until chemical changes heighten its irritative action, and it becomes capable of establishing new points of irritation, such as are seen in *granular urethritis*, so-called. It is not impossible or improbable that, as Desormeaux and Cruise have taught, the granular spots found in the urethra in cases of gleet *may* be the beginning of Stricture; but it is positively true that they may be, and most frequently are the legitimate progeny of an *already-formed Stricture*, anterior to the point of their location, and it is equally true that unless Stricture has already occurred as a result of the granular urethritis, the cure of the anterior co-arctation will result, without other treatment, in the disappearance of the granulations, and a complete restoration of the canal to its normal condition. The treatment of gleet by a systematic introduction of sounds and bougies, medicated or otherwise, is based upon the idea of a possible co-arctation of the urethra at some point. Ordinarily this plan is resorted to in the most empirical way, simply because the introduction of sounds and bougies is recommended by authorities for the cure of gleet. By our most intelligent surgeons, it is directed to the dilatation of Strictures, which have been suspected, or detected by the bulbous sound or bougie, and with a full appreciation of the probable dependence of the gleet upon the presenting Strictures.

That this plan, intelligently pursued, has often cured gleet, no one will for a moment gainsay; but that it permanently removes the *cause*, no one at this day is likely to affirm. Nothing is more distinctly laid down in the writings of authorities in regard to the treatment of urethral Stricture, than that the results of dilatation are *always* of a *temporary* character. So that it is well understood, in cases of the cure of gleet by dilatation of the Stricture or Strictures upon which it is dependent, *subsequent* dilatation must be kept up *indefinitely*, at varying intervals, in order that the gleet may not again be established. For a permanent cure a complete division of the contracting Stricture must be had, and any treatment which falls short of this will, of necessity, fail in doing more than to temporarily remove the obstruction which has been the cause of the gleet. The radical cure of Stricture was made the subject of a paper read by me before the New York State Medical Society in February, 1875, and may be found in the Transactions of that Society for that year. In that paper, the carefully tabulated results of two hundred and three operations will substantiate, in some degree, the claim I have made in regard to the constant association of Stricture with gleet; and the results of operations as there recorded will also make it manifest that my confidence in the radical cure of Stricture, as well as of the gleet which is so frequently associated with it, is not without reasonable foundation.

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CHAPTER VI.

RETROSPECT.

THE directness with which issue was taken, in the foregoing paper, with the time-honored views in regard to the normal urethral calibre, especially as those views were believed to be still held tenaciously by the great representatives of the English and French schools,* and the positive assumption of a mechanical cause for the persistence and even of the existence of gleet, together with the importance claimed for the slightest urethral contractions, normal or pathological, especially at the meatus urinarius, very naturally excited a widespread professional interest. A large and influential conservative party was evidently disturbed by views so radically opposed to the teachings of the fathers, from the earliest days, and an interest, that fell but little short of a general professional excitement, was felt when it was announced that my honored and accomplished colleague, Dr. Henry B. Sands, Professor of Anatomy in the College of Physicians and Surgeons, would

* In a clinical lecture delivered by Sir Henry Thompson, November 18th, 1875, and published in the London Lancet of December 11th, 1875, p. 827, is the following, "When therefore a young man consults you for certain troubles, relative to which you desire to learn whether urethral obstruction be a cause or not, do not be tempted for an instant to adopt so unnecessary a course (to say the least) as the introduction of very large instruments or of instruments with huge bulbs at the end of them. But take simply a flexible English gum-elastic bougie, well curved towards the point, with a blunt end, (since a tapering point, of course, will not mark distinctly the site of Stricture), not larger, as a rule, than No. 10 or 11 of our scale (19 to 20 millimetres circumference) and pass it very gently and slowly into the bladder. If it goes easily, above all, if it is withdrawn without being held, and slides out with perfect facility, take my word for it, he has no Stricture, and, *quoad*, obstruction, wants no use of instruments whatever"

make this pamphlet the subject of criticism in a paper to be read on the 24th of January, 1876, before the New York County Medical Society of which he was then President.

In accordance with this announcement, on the date then named, Dr. Thomas Addis Emmet, Vice-president of the Society, presiding, Professor Sands read the following paper

"*On Gleet, and especially its relations to Urethral Stricture.*"

"SURGEONS often pride themselves upon the certainty of their art when compared with that of medicine; yet the humiliating confession must be made, that many important surgical problems still remain unsolved. To survey our present knowledge concerning a common but obscure disease, may not prove an unprofitable task, and may stimulate us to renewed efforts in obtaining clearer and broader views respecting its pathology and treatment. I offer no apology, therefore, when I invite you to consider the nature of gleet—an affection which is sure to command the attention of every surgeon, both on account of its frequency, and of the difficulties that are often encountered in effecting its removal.

In recent times the term gleet has been employed in a very comprehensive sense, and has been made to refer to nearly every morbid urethral discharge, except that which is characteristic of acute urethritis. Thus we read of idiopathic gleet, due to the strumous or the gouty diathesis; of prostatic gleet, dependent on masturbation, vesical calculus, or piles; and of gleet caused by the simple contact with the urethra of highly-acid urine. We shall avoid much confusion, I think, by giving to the word the restricted meaning which was ascribed to it by John Hunter, Sir Astley Cooper, and most of the earlier writers, who understood gleet to signify an imperfectly cured or chronic gonorrhœa. In this sense alone I shall employ the term; and, although not prepared to deny the existence of the other varieties of gleet, I will say that I have very rarely met with any of them in practice.

Understanding, then, that gleet is only a sequel of gonor

rhœa, I remark that there is no very clear line of distinction between gleet and its parent disease. The term gleet has reference partly to the character and partly to the chronicity of the discharge. After a gonorrhœal secretion has lasted for a period varying from one to four weeks, it almost always diminishes in quantity, while at the same time it becomes thinner and less opaque; and a little later, in favorable cases, it disappears altogether, leaving the patient secure against a return of the disease, unless he is again exposed to contagion. Not unfrequently, however, the disease abates in intensity, but does not entirely disappear; and the gleety discharge that remains may continue indefinitely, often for months, sometimes for years. The character and quantity of the discharge, too, vary as greatly as its duration. When most characteristic, it is thin, only slightly viscid, and nearly transparent; at times, however, especially after excess in eating or drinking, it exhibits more distinctly the puriform character of the original gonorrhœal secretion. The quantity voided daily may be just sufficient to stain the linen moderately, or it may be almost imperceptible. Often it is noticed only in the morning after rising, or when it is caused to escape by pressure exerted along the anterior part of the penis and urethra. Usually, the disease is unattended with pain, and does not affect the general health. Some patients, however, suffer greatly from anxiety and depression of spirits, and all of them are liable to an aggravation of the disorder after excess or fatigue.

The brief outline of the symptoms of gleet which I have now given will serve to identify it as the affection with which all of us are so familiar. Omitting, for the present, the consideration of its pathology, I will say a few words respecting its management and cure.

And, at the outset, it cannot be denied that in some cases —and these not always the least severe—recovery appears to take place spontaneously. I have known such recoveries to happen after the disease had existed for many months, and after the usual remedies had been employed in vain. These

cases are rare, yet they certainly do occur, and the truth of my statement will, as I think, be confirmed by the experience of every surgeon present. But such instances are doubtless exceptional, and usually treatment, either local or constitutional, is required to eradicate the disease. Sometimes its removal is favored by a spare, at other times by a generous diet, combined with change of air and scene. Sea-bathing, and tonic food and medicines, have cured many a gleet that has resisted the ordinary specific remedies for this disease. But other kinds of constitutional treatment may be indicated; and the presence of a gouty, or strumous, or rheumatic diathesis, may call for its appropriate treatment, to aid in subduing the local disorder. Among internal remedies, copaiba and cubebs have always and deservedly been held in high esteem. Alkalies also, when largely diluted, are not without value in certain cases. In my own experience, however, local treatment has generally proved most efficient in the removal of gleet. Injections, either mild or strong, superficial or deep, according to circumstances, or the occasional introduction of a full-sized bougie into the bladder, have generally yielded satisfactory results. When these and other similar methods of treatment fail, the disease will often be found to depend on a Stricture of the urethra, which, when discovered, should be got rid of by some one of the plans of treatment appropriate to that affection.

I have enumerated these items of treatment, because they will aid us in attempting a solution of the question which it is my chief object to discuss this evening; namely, the pathology of gleet, concerning which, as it appears to me, many surgeons at the present day hold views that are exclusive and erroneous.

In the first place, then, let us bear in mind that the term gleet denotes merely a symptom, and does not indicate the essential nature of the disease. Like the analogous word leucorrhœa, it has a vague meaning, and serves often to hide a great deal of ignorance. The muco-purulent character of the discharge proves it to be inflammatory; while we can be

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equally certain that it proceeds either from the urethra itself, or from some of the minute canals which open into this division of the genito-urinary tract. Pus secreted from any part of this extensive surface will probably issue from the external meatus in the form of gleet, but that which is the product of cystitis or pyelitis will escape only during micturition.

Regarding gleet, then, as a symptom of chronic inflammation, affecting some portion of the genito-urinary tract anterior to the bladder, what means have we at our command for determining more precisely the locality of the disease? Here we begin to feel that our resources are limited, and our knowledge imperfect; yet much light may be thrown upon this point from three sources, namely: *post-mortem* examination, the exploration of the urethra during life, and the effect of remedies upon the disease.

The pathological changes which *post-mortem* investigations have revealed as connected with gleet, are thus described by authors. Sir Astley Cooper wrote in 1826: "If you examine the urethra after death, you will find the following appearances: inflammation extending for two or three inches down the urethra, and if the urethra be laid open within twenty-four hours, it will be quite florid as far as the seat of the gleet, but pale in the other part. The discharge does not proceed from the vesiculæ seminales, or Cowper's gland, or the prostate, but from the lacunæ. The discharge commonly called gleet proceeds from the lacunæ of the urethra." * Rokitanski has observed "Tumefaction of the mucous membrane, enlargement of the follicles, relaxation of the sinuses, and a white or colorless secretion." † Sir Henry Thompson says: "Observation demonstrates that the two spots which suffer most from gonorrhœal inflammation are the fossa navicularis and the bulb; I have had opportunities of observing this two or three times in the dead-house on the bodies of patients who had been suffering from gonorrhœa shortly before death. Unusual vascularity is found in the latter situation, particularly if the affection have been chronic, while the intermediate part appears comparatively very little affected." * Foerster remarks that "Blenorrhœa sometimes lasts for a very long time without causing any material alteration in the texture of the mucous membrane." † Finally, stricture of the urethra has been frequently noticed at *post-mortem* examinations of persons who, during life, had suffered from obstinate gleet.

* London *Lancet*, vol. iii. p. 271.
† "Pathological Anatomy," vol. ii., p. 179.

To sum up, then, the lesions that morbid anatomy has demonstrated to be connected with gleet, we find swelling and increased vascularity of the urethral mucous membrane, enlargement of the lacunæ, and sometimes organic Stricture. On the other hand, the disease occasionally leaves no traces that can be discovered after death. Now, these records show plainly enough, to my mind, that the essential cause of gleet is a catarrhal inflammation of the urethral mucous membrane, and of the numerous follicles or lacunæ opening upon its surface. The textural changes—except when Stricture is present—are usually slight, and in some cases, even when gleet has existed for a long period, no material pathological alterations can be detected. We notice here an evident analogy between the urethral and other mucous membranes. Nearly all of them, when inflamed, furnish a muco-purulent secretion, which may continue for a long time without leading to any striking textural changes in the parts affected. It is interesting to note the morbid alterations which have been observed in the lacunæ. Doubtless the implication of these slender and remote recesses will, in many cases, explain the obstinacy of the disease; for we cannot apply our remedies directly to the inflamed surface. The rebellious character of that chronic inflammation of the eyelids called tinea ciliaris is, doubtless, due to a similar cause, namely, the extension of the disease to the Meibomian follicles. Finally it is also interesting to notice that there are two parts of the urethra which are especially prone to chronic inflammation, namely, the fossa navicularis and the bulb. We shall find that these facts

* On "Stricture of the Urethra," p. 80.
† "Pathological Anatomy," p. 553.

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in morbid anatomy corroborate the results obtained by clinical observation.

In the second place, let us inquire how far the pathology of gleet can be deduced from an examination of the diseased parts during life. Sometimes the sensations of the patient afford a clew to the locality of the disorder. A feeling of itching, soreness, or smarting, in a certain part of the urethra, either during or after micturition, *may* coincide with the presence of inflammation at that part. Frequent desire to micturate *may* indicate an extension of the morbid process into the prostatic segment of the urethra. A sensation of straining and difficulty in voiding the urine may point to Stricture as a probable cause or complication. In many cases, however, the patient experiences no morbid sensation, and is aware of the existence of his disease only by the appearance of the gleety discharge.

The length and narrowness of the urethra render the visual examination of its deeper parts difficult and uncertain, and the endoscope has failed to fulfill the predictions that were made respecting its usefulness. Yet the instrument, doubtless has a certain value, and by means of it we can often detect circumscribed spots of inflammation of the urethra, the affected portions of mucous membrane exhibiting an uneven, granular, and highly vascular surface. These granulations are sometimes abnormally sensitive, and readily bleed when touched. They are often present in the fossa navicularis, where their detection is easy, but they occur with greatest frequency in the bulb. Much stress has been laid upon the presence of these granular patches, both as a cause of gleet, and as a forerunner of Stricture; yet it is an error to regard them as invariably present. They are absent in many, if not in most, of the milder cases, and cannot therefore be regarded as the sole cause of gleet. Many years ago Kleeburg* announced that, in certain cases of this disease, the glandular follicles studding the mucous membrane adjacent to the external meatus were swollen, red, and filled with muco-purulent secretion; and, having made the diagnosis, he readily effected a cure by probing the diseased ducts with the nitrate of silver. Robert* states that he has been able, in a number of instances, to cause an escape of pus from these follicles, by pressure made upon their walls. These observations I have confirmed by experience, and the facts are important, inasmuch as they render it highly probable that the lacunæ farther behind, which differ from these only in situation, are often affected in a similar manner. The deep-seated lacunæ cannot be satisfactorily examined during life, but we have *post-mortem* evidence that they are implicated in gleet.

* "Schmidt's Jahrbücher," 1836, p. 35.

The exploration of the urethra by means of sounds often affords much useful information, and, in obstinate cases, should never be neglected. When the point of the instrument passes over an inflamed patch of mucous membrane the patient will often complain of pain, yet not always, for sometimes the diseased parts are not very tender. In examining the prostatic portion of the urethra, we shall be misled if we fail to bear in mind the natural sensitiveness of this region. The special value of sounds, however, is that of enabling us to detect the presence of organic Stricture, which is so often associated with gleet. In certain cases bulbous sounds afford the easiest means of determining the presence and locality of a Stricture.

In the third place, the pathology of gleet is, in some degree, elucidated by observing the action of remedies upon the disease. The frequent success which follows the employment of topical astringents points to the catarrhal character of the inflammation, while the successful application of such remedies to certain limited parts of the urethra indicates that these parts are especially involved in the morbid process. Many gleets are cured by the introduction of stimulating ointments or powders into the fossa navicularis, while others, which are not benefited by this mode of treatment, yield readily enough when the remedies are inserted as far back as the bulb. The disappearance of a gleet after the removal of a Stricture shows

* "Maladies Vénériennes," p. 80.

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the dependence of the former on the latter; while, in the absence of Stricture, the persistence of a gleet for years, in spite of treatment, probably often coincides with a thickened and congested state of the urethral mucous membrane along its entire length. I have seen cases which I have thought to be of this description, in persons of intemperate and otherwise irregular habits, and it seems reasonable to suppose that the urethral mucous membrane should be liable to the same kind of inflammation as that which we so often observe in the lining of the urinary bladder.

We may now conveniently enumerate the following morbid conditions as causes of gleet:

1. Chronic inflammation of the urethral mucous membrane, either diffused over the greater part of its surface, or limited to particular spots—those most liable to disease being the fossa navicularis and the bulb.

2. Inflammation of the lacunæ which open into the urethra.

3. Stricture of the urethra.

4. Inflammation of Cowper's glands, the prostatic ducts, or the seminal vesicles. These, as well as chronic abscesses connected with the urethra, and warty vegetations studding its surface, are but very rarely causes of gleet.

I now propose to examine certain views respecting the pathology of gleet, which I find to be widely prevalent at the present day, and which have for their most earnest and able advocate my distinguished colleague, Prof. Otis. They assume that gleet depends invariably on organic Stricture, especially upon what are denominated Strictures of wide calibre, and that the division of these by internal urethrotomy affords a method, and indeed the only method, of radical cure. To detect these Strictures, certain special means of exploration are said to be necessary, and perhaps I cannot better set forth the views to which I allude than by quoting the following sentences from some of the latest contributions to the literature of this subject:

"Chronic gonorrhœa, gleet (also variously designated as prostatic, gouty, scrofulous), is dependent, as a rule, on ab-

normal contractions of the urethral canal. The only exception that I recognize (aside from the presence of polypoid or warty growths in the urethra) is the engagement of urethral sinuses, as the lacuna magna, or some one of those occasionally met with near the meatus, possibly deeper down, and these I have never found engaged unless more or less co-arctation at an anterior point was also present. Gleet is always dependent upon Stricture."* Again: "A constant relation appears to exist between the urethral calibre and the size of the penis with which it is associated. This is a fact demonstrated by careful measurements made with the urethrametre in several hundred cases, without exception being met. The proportion runs as follows: when the flaccid penis measures 3 inches in circumference, the size of the urethra will be 30 millimetres in circumference, or more. When it is $3\frac{1}{4}$ inches, it will be 32 or more; $3\frac{1}{2}$ inches, 34; $3\frac{3}{4}$ inches, 36; 4 inches, 38; $4\frac{1}{4}$ to $4\frac{1}{2}$ inches, 40 or more millimetres."† The urethra-metre is an ingenious instrument, the extremity of which is capable of being expanded into a sort of fenestrated sphere by the action of a screw at the handle, the circumference of the part expanded being indicated by a steel hand traversing a dial-plate. To ascertain the normal calibre of a given urethra we are instructed to introduce the urethra-metre closed, "down to the bulbo-membranous junction. At this point the bulbous part of the instrument is to be expanded, by means of the screw at the handle, until a feeling of fullness is experienced, when, if there is no Stricture at the point of trial, the hand on the dial-plate will indicate, with sufficient certainty, the normal calibre of the urethra under examination. Now, drawing the instrument slowly out, if Stricture is present, the bulb will be arrested at that exact point. The screw is then turned, diminishing the size of the bulb, until it slips through the co-arctation, when a glance at the dial will show the calibre of the Stricture. This, subtracted from the figures indicating the normal calibre, will

* "Gleet, and its Relations to Urethral Stricture," by F. N. Otis, M. D., 1875.

† F. N. Otis, *op cit.*, p. 254.

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give the precise value of the contraction. The remainder of the canal, examined in the same way, brings the bulb finally to the meatus, when, in the same manner, the greater or less deviation from the normal size will be shown." * "Vertical sections of the penis, from the junction of the glans with the body of the penis, show a uniform calibre throughout the fossa navicularis, to its external boundary at the meatus, the opening of which is of corresponding calibre. This may be accepted as the normal condition of these parts, and any variations from such uniformity may be considered aberrations from the normal condition." † The Strictures which are supposed to cause gleet need not be close; indeed, they are commonly such as would escape detection by the ordinary methods of examination. "If a urethra presents, the normal calibre of which is equal to a circumference of thirty millimetres of the French scale, and only twenty-nine of bulbous sound will pass without detecting obstruction, then the urethra is not 'about right.' It is strictured to the extent of one millimetre in circumference, and can never be a healthy urethra while that Stricture remains." ‡

Now let us inquire whether these statements can be verified. If so, we shall find established an important principle in the treatment of gleet.

I willingly admit that, if the healthy urethra has a uniform calibre, which can be ascertained and measured with precision, it will be possible to detect the slightest abnormal deviations from its size. We must, however, obtain a clear idea of what is meant by the *calibre* of the urethra, as the use of the phrase has a conventional rather than a literal signification. The word calibre is ordinarily employed to indicate the size of a tube, such, for example, as the bore of a gun. If the urethra were such a tube, and if its walls were firm and inelastic, there would be no trouble in determining its calibre. But anatomists have long recognized the fact that the urethra is *not* a

* "Gleet, and its Relations to Urethral Stricture," by F. N. Otis, M. D., p. 253

† Dr. F. N. Otis, New York Medical Journal, April, 1874.

‡ F. N. Otis on "Stricture of the Male Urethra," p. 9.

tube, except when it is distended. Not only the mucous membrane which forms its immediate boundary, but the erectile and other tissues which surround it, are sufficiently elastic to close the channel completely, unless it is either naturally or artificially distended. This fact is readily demonstrated by transverse sections of the penis, both of the dead and of the living body. On examining the surface of such a section, we notice that the situation of the urethra is denoted merely by a linear depression, caused by the complete contact of the opposed urethral walls. This contact extends throughout the entire length of the urethra. By the expression calibre of the urethra, therefore, we are to understand the size of the canal when distended. Indeed, the phrase can have no other meaning. Now, as the urethral walls are elastic, it must be evident that the calibre of the urethra will vary within certain limits, depending upon the elasticity of these walls, and upon the amount of force used to separate them. Properly speaking, the normal calibre of the urethra would be its size when moderately distended by the urine during micturition; and, although we cannot estimate this with accuracy, we have reason to believe that it is not very large.

Anatomists have employed various methods for determining the calibre of the urethra, by experiments performed upon the dead subject. One of these methods consists in laying open the urethra by an incision along its entire length, and afterward stretching it out upon a flat board, and fastening it down with pins along the edges of the section. This has been done by Malgaigne, Jarjavay, Thompson, and others; and the specimen which I now exhibit has been prepared in this manner. It affords the following measurements, and is well adapted to display the *relative* calibre of different portions of the canal:

Meatus	21	millimetres.
Fossa navicularis	38	"
Three inches behind meatus	26	"
Bulb	30	"
Membranous portion	20	"
Prostatic portion	38	"

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The best method of ascertaining the greatest possible distensibility of the urethra is undoubtedly that employed in 1852 by Reybard, who introduced into the canal an instrument having at one extremity a pair of steel blades, which could be separated by turning a screw at the handle, the distance between the blades being indicated by a steel hand upon a dial, as in Dr. Otis's urethra-metre. Successive parts of the urethra were submitted to the action of these dilating blades, which were separated in every instance as far as possible, without causing a laceration of the urethral mucous membrane. The greatest separation of which the blades were capable was eighteen and a half millimetres.

Upon examining, in the manner described, a subject sixty years of age, Reybard found: 1. That the meatus could be dilated, without rupture, to double its natural size.

2. That, in that portion of the urethra corresponding with the middle of the penis, the blades could be separated fifteen millimetres, thus indicating a circumference of forty-six millimetres.

3. That in the bulbous, membranous, and prostatic divisions of the urethra, the instrument could be expanded to its greatest diameter, namely, eighteen and a half millimetres. This indicates, for all these parts, a calibre of at least fifty-eight millimetres.

On repeating the experiment in a subject of twenty-five to thirty years of age, Reybard found the same relative diameters in the different regions of the urethra, but found the diameter, in each of them, seven to eight millimetres less than in the older subject. I am not aware that any attempt has been made to ascertain whether the urethra of the living subject is capable of bearing such a degree of distention as was effected in these cases, yet I think it quite possible that the experiment would succeed if the dilatation were cautiously and gradually applied.

Another mode of estimating the calibre of the urethra is to obtain a cast of the canal, by injecting it with some kind of solidifiable material, such as fusible metal, plaster of Paris,

or wax. I have tried all of these substances, and have found the latter to answer best. It is more manageable than either

CASTS OF URETHRÆ.

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of the others, as it melts at a low temperature, and can be made to solidify quickly by being subjected to the action of cold water. Plaster of Paris does not run very easily when the mixture is thick, and when it is thin it is slow to harden. Fusible metal makes a firm and durable cast, but it becomes solid at so high a temperature, and so quickly, that we can seldom be sure the canal has been fully distended. The casts which I exhibit have been made for me by Dr. Charles McBurney, the able demonstrator of anatomy in the College of Physicians and Surgeons, who has bestowed mnch time and care in preparing them. The urethræ which they represent were free from any evidences of disease. In all cases the nozzle of the syringe was introduced into a pouch of vesical mucous membrane, obtained by making a circular incision through the membrane, about an inch behind the internal orifice of the urethra, and then dissecting it up from the subjacent parts. By this means the urethra is more certain to be thoroughly distended than when the injection is thrown into the bladder, while at the same time the canal itself is not interfered with. To secure a perfect cast of the external meatus, a similar plan was pursued in all cases but one. Instead of closing the meatus by suture, a portion of the integument of the glans penis was dissected up, thrown forward over the meatus, and then surrounded by a ligature. It thus formed a pouch which received and retained the injection after it had passed through the meatus.

In making such an injection, the amount of force employed may be greater or less; and, accordingly, the distention of the urethra will be much or little; but in all cases the entire surface will be subjected to *equal* pressure; and, consequently, although preparations obtained in this manner may not afford a certain test of the relative calibre of different urethræ, they offer a perfectly reliable indication of the relative calibre of the different portions of any given urethra. I exhibit to you four casts, each one representing the entire length of the urethra. Cast marked No. 1 was made by the employment of a moderately distending force. In obtaining

the remaining three, as much force was used as it was thought the urethral wall would bear without rupture. The accompanying table gives the dimensions of different parts of the urethra as indicated by the different casts. In all instances the figures represent the circumference in millimetres.

	No. 1. Æt. 40 to 50.	No. 2. Æt. 27.	No. 3. Æt. 40.	No. 4. Æt. 29.
Meatus	26	25	22	30
Fossa navicularis	30	44	40	43
Three inches behind meatus	32	36	35	36
Bulb	40	47	41	61
Membranous portion	20	25	26	30
Prostatic portion at its widest part	30	40	45	53
Internal meatus	18	35	50	40

Now, the comparison of these figures shows some curious results. Cast No. 1 is considerably smaller than the rest, and this fact may perhaps be accounted for by the moderate force that was employed in introducing the injection. The remaining three were all the result of the greatest distention it was thought safe to employ, yet they differ considerably in size, No. 4, especially, being larger than No. 2 or No. 3. I think it fair to assume that the varying size of casts 2, 3, and 4, indicates a corresponding variation in size in the respective urethræ, although it cannot be *proved* that the distending force employed in every instance was the same in amount. But assuming that it was so, or nearly so, we ascertain that the dimensions of the adult male urethra vary in different individuals. Whether these variations bear any definite ratio to the circumference of the penis, is a question that it will be convenient to postpone for the present. I will only add, in this connection, that the facts here demonstrated on the subject confirm the observations that have long ago been made by surgeons and anatomists, who have generally admitted differences in the calibre of healthy urethræ.

The table also shows that the calibre of the urethra, es-

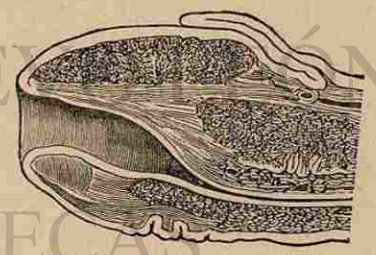
pecially of its bulbous portion, is, in some instances, much greater than it would appear to be from any examinations which have ever been made to ascertain its size during life. This statement agrees with the results already obtained by Reybard, in the experiments I have alluded to.

But the special value of the figures is the unfailing indication which they afford of the want of uniformity in calibre of different parts of the same urethra. This is no new fact, yet the recognition of it is so important in the present discussion, that I may be pardoned for setting it clearly before you.

We notice, then, in examining any one of these casts, that it represents the urethra as displaying a series of alternating contractions and dilatations throughout its entire course. The meatus is generally contracted; then follows a dilatation, somewhere in the glans penis, the fossa navicularis; behind the fossa navicularis the urethra is again narrowed for a distance of several inches, when it expands more or less gradually to form the bulb; behind the bulb is a third contraction, corresponding with the membranous division of the urethra; and finally we reach the last dilatation in the prostatic portion, and the last constriction at the internal meatus. We thus observe three dilatations, namely, in the fossa navicularis, the bulb, and the prostate; and four contractions, these being at the meatus, behind the navicular fossa, throughout the membranous portion, and at the internal orifice of the urethra. These dilatations, as is well known, are all found along the inferior wall or floor of the canal. I note the fact, in passing, that, with one exception, these casts demonstrate the bulb to be the widest or most dilatable portion of the canal. The prostatic portion is said to be the most dilatable, but, owing to the firmness of the tissues which surround it, great force is needed to expand it. In cast No. 3 the bulb is not so wide as the prostatic portion, yet it is wider than any part situated in front of it.

These contractions and dilatations of the different parts of the urethra have long been familiar to anatomists, and have seldom been called in question. Their presence is tacitly

denied, however, when it is affirmed that the calibre of the urethra is indicated by the dimensions of the bulb. The dilatation called the fossa navicularis was known to the older anatomists; it was described by Vesalius and Morgagni, and has been admitted by all authors with whom I am acquainted except Amussat and Dr. Otis. Amussat denied its existence; but the arguments which he employed are by no means convincing, and have been fairly refuted. Dr. Otis also denies the existence of the fossa navicularis, and regards the presence of a narrow meatus as abnormal. He says: "Vertical sections of the penis, from the junction of the glans with the body of the penis, show a uniform calibre throughout the fossa navicularis to its external boundary at the meatus, the opening of which is of corresponding calibre. This may be accepted as the normal condition of these parts, and any variations from such uniformity may be considered aberrations from the normal condition."* Dr. Otis does not state, however, that he has ever made these sections himself, and he is in error when he quotes the authority of Henle in support of his assertion. The accompanying plate, which is borrowed from that anatomist's work,† is designed by its author to illustrate the arrangement of the erectile and other tissues in the glans penis; and, moreover, Henle‡ states, distinctly in the text, that the meatus and the membranous portion are the narrowest parts of the urethra. He gives seven millimetres as their average diameter. Now, the correctness of this statement is capable of the easiest demonstration. I am well aware that a very wide meatus is occasionally seen, but the opening is usually narrow when compared with the urethra behind it, and I cannot avoid



VERTICAL SECTION OF ANTERIOR PORTION OF PENIS.

* Dr. F. N. Otis, New York Medical Journal, April, 1874.
† J. Henle, "Anatomie des Menschen," vol. ii., p. 424.
‡ *Op. Cit.*, vol. ii., p. 393.

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the conclusion that Prof. Otis has mistaken the exception for the rule.

There is a peculiarity respecting the anatomy of the fossa navicularis, which I have not seen mentioned by anatomists, and which is illustrated by the casts now exhibited. I may remark that I have noticed the same peculiarity in the living body—I refer to the situation of this fossa. It is always found in the glans penis; but, while in some instances it is distant three-quarters of an inch or more from the meatus, in others it is placed almost immediately behind this opening. When it is situated at some distance from the meatus, that part of the urethra which lies in front of it is usually narrow, and of uniform diameter. When it is found directly behind the meatus, it appears as an abrupt dilatation, as in cast No. 3, when the meatus measures twenty-two millimetres, and the fossa navicularis forty millimetres, in circumference. In some cases, as in that represented by cast No. 1, the fossa navicularis is only slightly marked, but I have rarely known it to be entirely absent.

Now, it may be objected to the statements I have thus far made, that they relate merely to the dead subject, and that, the preparations which I have shown cannot indicate either the absolute or the relative calibre of the urethra in the living body. Accordingly, I have made some investigations with the view of correcting any errors that might have arisen from the study of the cadaver alone. I have been induced to proceed with great caution, however, in this matter, to avoid the injury to the urethra that might otherwise result.

In practice, we find in the size of the meatus a rough test of the calibre of the urethra. As this is generally as narrow as any other part of the canal, we assume that the largest sound it will admit ought easily to traverse the entire urethra, unless Stricture is present. And this rule I have usually found a good one, although, when the meatus is exceptionally small, it may be desirable to enlarge it, either for the introduction of a full-sized lithotrite, or for the examination of a

Stricture which is not very tight. But, unless the meatus is unusually large, the *greatest* calibre or distensibility of the urethra cannot be tested by the largest sound that will pass through this opening, and I have found the ingenious instrument devised by Dr. Otis of great value in conducting this part of the investigation. I am unable, however, to obtain with the urethra-metre the same results as those recorded by Dr. Otis.

In the first place, I can discover with it no exact ratio between the calibre of the bulb of the urethra and the circumference of the penis. On the one hand, the circumference of this organ, even in its flaccid state, is liable to variation; and, on the other, the "feeling of fullness" that is said to indicate the distention of the urethra is, so far as I am able to appreciate, no reliable sign that the walls of the canal have been fairly stretched. I have carefully examined the urethræ of twenty healthy adults, and, with a single exception, I have succeeded in expanding the urethra-metre to its fullest extent, namely, forty-five millimetres, without causing pain or inconvenience. In many of these instances I have been able to move the instrument, while thus expanded, forward a distance of an inch or more, without encountering resistance. I infer, from these results, that the bulb of the urethra in the living subject is generally capable of greater dilatation than can be effected with the urethra-metre, and that this instrument has failed to prove the existence of a definite ratio between the calibre of the urethra and the circumference of the penis.

In the second place, I have always found, when the instrument was expanded so as to distend only moderately the bulb of the urethra—and yet move freely within it—that, on attempting to withdraw the instrument, it would be arrested about one inch in front of the bulb, and that it became necessary to reduce its size before it could safely be drawn forward. It would then pass on easily until its expanded portion reached the meatus, when generally a further reduction became necessary before it could be finally withdrawn. In

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short, while the urethra-metre, in my hands, has failed to indicate the exact calibre of the urethra, as compared with the size of the penis, it has shown variations in the distensibility of its different parts, corresponding with those which have been demonstrated by the employment of injections in the dead subject.

The application of these facts is at once easy and important. If they can be verified, they prove indubitably that the assumption of an unvarying calibre for any urethra is unwarrantable; and it is plain that such an assumption must lead to the gravest errors in practice. If the calibre of the bulb of the urethra be taken as an indication of what the calibre of all parts of the canal in front of it *ought* to be, I cannot understand why Stricture will not frequently be diagnosticated when none really exists. And, when it is remembered that not less than fourteen Strictures in the same urethra have been supposed to be revealed by this mode of examination, we may reasonably suspect, in the absence of *post-mortem* evidence, that there is something fallacious in the method employed. In fact, I am convinced that, when a healthy urethra, which has not been previously stretched, is explored, either with the urethra-metre, or with very large bulbous sounds, the instrument will often be tightly grasped at certain points, and communicate to the examiner a deceptive sensation, as if a Stricture were present. This may possibly arise from one of several causes, as, for example, a deviation of the sound from the axis of the canal, a spasmodic contraction of the muscular fibres that surround the urethra, or a puckering of its mucous membrane before the instrument. Another explanation is suggested by certain interesting appearances in the urethral casts which I have just exhibited. Instead of presenting a smooth and even surface, they are often marked by slight transverse furrows and alternating ridges, indicating that the urethral mucous membrane, when greatly distended, yields more readily at some points than at others.

I should be sorry to have it inferred, from anything I

have said, that I am opposed to the operation of internal urethrotomy for the cure of Stricture. Some of the most gratifying results in modern surgical practice have been achieved by this method, but I believe it to be applicable chiefly to the treatment of close Strictures, and as an auxiliary to dilatation. The dilating urethrotome, invented by Reybard many years ago, never met with general favor, on account of the accidents which attended its use, and the success of safer and milder methods of treatment. I am a firm believer in what, I fear, is becoming an old-fashioned doctrine among us, namely, that gradual dilatation is far the best treatment yet discovered for the great majority of urethral Strictures. In regard to what are termed Strictures of large calibre, I believe that they rarely exist, and that, when they do, they seldom cause the symptoms which have been ascribed to them. I fully indorse the statement made by Sir James Paget, who says: "Every year teaches me more and more plainly that a very large number of cases of Stricture of the urethra are not really dependent on any fixed condition of the urethra, but upon mere swelling of its mucous membrane, upon just such swelling as, with chronic catarrh, narrows or shuts up one or both nostrils. Manual surgery should find little or nothing to do in cases such as these."*

I desire also to express my disapproval of the habitual use of *very* large sounds, as I believe that a sound exceeding twenty-five millimetres in circumference is rarely necessary, either for the diagnosis or treatment of a urethral Stricture, and that a canal, even smaller than this would indicate, may permit the ready evacuation of the bladder. The fact that the urethra *can* be distended considerably beyond this limit is no proof that it ought to be, and unquestionably much evil may result from over-distention.

Finally, I cannot help thinking that the practice of slitting up the meatus, now so much in vogue among us, is injurious and irrational. The normal meatus is narrow, and its small

* "Clinical Lectures and Essays," London: 1875.

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size doubtless favors the projection of the stream of urine during micturition. When it is enlarged by a free incision along the floor of the urethra, the penis is thereby deformed, and a condition of artificial hypospadias is established. Except in special cases, therefore, it ought to be left as Nature has made it.

If, upon all these matters, I have stated my convictions somewhat emphatically, it is because I am deeply impressed with their important bearing in practice. My sole object has been to elicit truth; and, if I have ventured to criticise freely, I am willing that my own views shall be criticised in the same candid spirit.

The paper read by Dr. Sands being before the Society for discussion,

DR. OTIS was called upon by the acting President Dr. Emmet and spoke at some length in reply to the paper of Prof. Sands, occupying the time until the hour of adjournment had arrived. When closing, he announced his intention to discuss the matter more fully at the next regular meeting of the Society.

CHAPTER VIII.

ON THE RELATIONS OF GLEET TO STRICTURE.

Discussion continued.—Dr. Otis's Reply.

AT the next stated meeting of the Medical Society of the County of New York, held February 28th, 1876, Dr. Thos. Addis Emmet, Vice President, in the chair, the discussion of the paper by Prof. H. B. Sands, On Gleet and especially on its Relations to Stricture of the Urethra, was resumed by Dr. F. N. Otis, as follows:

"Prof. HENRY B. SANDS opened his interesting and able paper "On Gleet, and especially in its Relations to Urethral Stricture," with these words: "*The humiliating confession must be made, that many important surgical problems remain unsolved.*" This was the statement of a fact which, in his opinion, was especially applicable to the subject which he was about to discuss.

In so many words, then, he confessed that gleet, and especially in its relations with urethral Stricture, was a problem for which he had, as yet, found no satisfactory solution. The object of the paper, as stated, was simply to excite discussion, and particularly with reference to views which had been advanced by me, in which I claimed to designate the true nature and cause of gleet, and the only effectual and radical cure for this acknowledged opprobrium of surgery.

Proceeding then to the definition of gleet, Prof. Sands referred to *idiopathic* gleet—gleet depending upon a *strumous diathesis*, *prostatic gleet*, *masturbators' gleet*, etc., and remarked, that "we shall avoid much confusion, by giving to the word the restricted meaning ascribed to it by John Hunter and Sir Astley Cooper, and regard it as an *imperfect* or

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chronic gonorrhœa." Now, as this matter is presented avowedly for the purpose of discussing my peculiar views in regard to *gleet*, and its *relations* to urethral Stricture, I shall most decidedly object to any such definition of gleet, as being, not simply imperfect, but as conveying impressions which, of necessity, will often lead to grave errors in the diagnosis and treatment of gleet.

I have stated it to be the rule, that all gleet depends upon *Stricture*, not that all gleet depends upon *gonorrhœa*. It seems to me, then, from my point of view, that, in order to consider the question of *gleet* intelligently, we must first discuss the nature and causes of *Stricture;* having settled these points, the different varieties of *gleet* will be sufficiently indicated. In regard to the nature and causes of gleet, in the opinion of Prof. Sands, this disease is simply *catarrhal.*

1. He says: "Gleet depends upon a chronic inflammation of the urethral mucous membrane, either diffused over a greater part, or limited to spots, chiefly to the fossæ navicularis and bulb.

"2. Gleet depends upon inflammation of lacunæ opening into the urethra.

"3. Gleet depends upon *Stricture of the urethra.*"

Supported by these three postulates, Prof. Sands takes exception to my claim that "*gleet always depends upon Stricture.*"

A *careful*, not a *hypercritical*, examination of his position will, I believe, tend to simplify the assumed points of difference between Prof. Sands and myself in regard to the causes of gleet, very materially.

I do not deny that it is a chronic inflammation; nor that it is sometimes found to be diffused over a great part of the urethra; nor that it is sometimes confined to spots; nor yet that it may occupy the continuous lining of the lacunæ and mucous follicles. In the present discussion, however, the locality and pathological results of gleet are not so much at issue, as the *cause* of the *continuance* of those conditions upon which the muco-purulent discharge which we call *gleet* depends.

I have so often seen *diffused* and *localized* inflammatory conditions of the urethral mucous membrane associated with urethral Stricture, and have so constantly seen them disappear, upon the division of the Stricture, that I do not hesitate to affirm my conviction that *all granular spots in the urethra* are the result of retention of acrid urine, behind Strictures more or less salient; and that the most favorable condition to induce implication of the lacunæ magna and the deeper sinuses and follicles is the presence of an anterior Stricture.

The term *gleet* is used by Prof. Sands as indicating an imperfect or chronic gonorrhœa. Now, gonorrhœa is a self-limited disease; an active inflammation, produced by contagion, which continues, according to our best authorities, for three or four weeks, under the most judicious treatment; and I may here add, whether treatment is had or not, for it is the rule that, under favoring physical conditions, it gets well, in about that time, with no treatment whatever. Prof. Sands says: "A gonorrhœal discharge, after it has continued from one to four weeks, *almost always* diminishes in quantity, becomes thinner and less opaque, and, in favorable cases, disappears altogether." Again he says, "*Not unfrequently*, the discharge *does not* disappear, and *may continue indefinitely.*" The difference, then, between gonorrhœa and "chronic or imperfect gonorrhœa" or *gleet* is, that the one gets well and the other continues indefinitely. In order to ascertain the reason of this continuance of a gonorrhœa—to find what constitutes the *punctum malum*—the essential difference between the favorable and the unfavorable cases, Prof. Sands gives a *résumé* of the results of the pathological researches of Sir Astley Cooper, Rokitanski, and Sir Henry Thompson. In some cases, unusual vascularity was found at the fossæ navicularis; in others, general tumefaction of mucous membrane; enlargement of follicles, relaxation of sinuses, etc., and yet in other cases "*no abnormal appearance could be detected.*" The summing up, then, of *these* researches seems to shed no light upon the *cause* of gleet; it simply presents the results of long-continued inflammation, of a low grade, in certain cases;

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while the fact that, in other cases *nothing abnormal* was found, is a sufficient commentary on the value of this method of ascertaining the cause of gleet. The pathological *résumé*, then, simply shows, that the cause of gleet was not determined by any *post-mortem* examination. Prof. Sands then cites the results of observations upon the living body. First, "soreness and smarting," he says, "may exist and mean nothing;" "frequent desire to micturate *may* mean the presence of a morbid process in the urethra; sensation of straining *may* point to urethral trouble, but gleet *may exist* and *persist*, unaccompanied by any morbid sensation. Circumscribed granular spots *may* exist, and be revealed by the endoscope, but cannot be regarded as the *sole* cause of gleet."

Observations during life, then, do not afford any definite information as to the *cause* of gleet.

The results of the action of remedies are next invoked to discover the cause of gleet. "Sometimes," says Prof. Sands, "its removal is favored by a spare, and at others by a generous, diet. Sea-bathing and tonic food and medicines have cured many a gleet that has resisted the ordinary specific remedies for the disease. In a strumous, gouty, or rheumatic diathesis, appropriate constitutional treatment may become necessary. "Copaiba and cubebs," he says, "have always and deservedly been held in high esteem. Alkalies also are not without value in certain cases. . . . In my own experience, however," says Prof. Sands, "*local* treatment has generally proved the most efficient in the removal of gleet. Injections, mild or strong, superficial or deep; the occasional introduction of a full-sized bougie into the bladder. *When these fail*," he remarks, "*the disease will often be found to depend upon Stricture of the urethra.*"

I am quite willing to concede the influence of all the remedies and plans of treatment above enumerated. I recognize the fact that, whatever be the cause of a catarrh of the urethral mucous membrane, a condition of constitutional plethora, or, on the other hand, of extreme debility, would favor its continuance; and that irritating urine, such as would

indicate the use of alkalies, copaiba, cubebs, etc., in any other trouble, would tend to palliate a gleet—nay, possibly, even cause the cessation of the discharge, where it was kept up by the irritating quality of the urine. But it is a very well-known fact (and I am quite sure that it will not be disputed by my friend Prof. Sands) that *cessation* of the discharge does not mean *cure*. The reason, the chief, I believe, that has induced the Professor to include the cure of gleet among the "unsolved problems of surgery" is, that, after cessation, under the varied treatment quoted, the discharge will, as a rule, return. A slight indiscretion in diet, a little vinous excess, a little venereal indulgence, of the most unexceptional character, *will bring back the gleet.*

The results of treatment, then, if they do not indicate the *cause* of gleet, teach us, at least, that it is not in any condition which such treatment can permanently control. Prof. Sands says, "*When these and other similar methods of treatment fail, the disease will often be found to depend upon a Stricture of the urethra.*"

Now, I would like to ask, in the most friendly and scientific spirit, why it is considered necessary to go through the above-mentioned category of constitutional remedies, and gleet specifics, and injections, and bougies, *before this question is raised*—nay, more, until it is *settled?* Again, I claim that, in order to discuss the subject of *gleet* intelligently, the subject of *urethral Stricture* must *first* be considered.

I have stated it as my opinion that "chronic urethral discharges are, *as a rule*, dependent upon urethral Strictures for their *continuance*," whether these Strictures be the product of a gonorrhœal inflammation in the first instance, or the result of inflammation of other origin.

It is not likely that there will be any important disagreement as to the manner in which Strictures are formed, but I do not quite agree with Prof. Sands, nor with the authorities he quotes, in ascribing the *first* place in the causation of Stricture to *gonorrhœa*. I recognize the fact that it is most often brought to our notice through the occurrence and per-

sistence of this disease, and that all preëxisting Strictures, or thickenings, or irritations, of the urethral mucous membrane, are increased and intensified by it.

I would like, for a moment, to call your attention to some of the other—the *non-specific*—causes of urethral inflammation and Stricture.

Sir Henry Thompson (whose views on so many points are in complete accord with those of Prof. Sands), in his work on "Stricture of the Urethra" (second English edition, page 114), headed "*Causes of Urethritis and thus of Permanent Stricture*," says: "Urine may possess an irritating quality from the predominance of an acid or an alkali in it; a persistence of either of these conditions must be recognized as one of the undoubted causes of organic Stricture. Thus," he says, "Sir Benjamin Brodie states that alkaline urine is more likely to produce the disease (Stricture) than that which is acid, and that persons secreting the triple phosphate are almost sure to have Stricture sooner or later." Mr. Liston says, in reference to attacks of acidity of urine, that "their continuance, or frequent occurrence, may lay the foundation of disease of the urethra." And further, Sir Henry Thompson says (ibid., page 115), "Excess of venery, protracted erections, and prolonged intercourse, are recognized causes of Stricture." Lallemand, Ricord, Sir Everard Home, Acton, Gouley, Gross, and others, recognize *masturbation* as a cause of urethral Stricture, and certainly if we can accept, with Sir Henry Thompson, excess of venery, etc., we cannot deny this influence to masturbation. I have myself seen several aggravated and undoubted cases which fully support this view; and, again, Sir Henry Thompson (ibid., page 117) says, "The influence of gout and rheumatism are undoubted causes of spasmodic Stricture; these diatheses, therefore, predispose in this manner to the accession of organic Stricture."

Not to pursue the causation of urethral Stricture further, for fear of wearying you, I desire now to ask your attention to a few observations upon, and natural deductions from, the foregoing citations from our most valued authorities.

In the first place, the influence of vitiated urinary secretions, excess of venery, prolonged erections, and protracted sexual intercourse, are distinctly recognized and insisted on, as a cause of organic urethral Stricture, and this, too, by authorities whose facilities for urethral examination were most imperfect, and hence could only detect, positively, the more advanced stages of Stricture. It is but just, it seems to me, to infer that, in very many cases examined by them when symptoms of Stricture were present, no Stricture was detected. The method now pursued by Prof. Sands, Sir Henry Thompson, and many other less enlightened surgeons, would signally fail in detecting the earlier invasions of Stricture in any urethra of a capacity above twenty-five millimetres in circumference.

Now, when we come to consider the proportion of men who, at some time in their lives, have suffered from acrid uninary secretions (from a gouty or rheumatic diathesis, and various other causes) from excessive venery, masturbation, etc., does it seem to you necessary to insist upon it that every subject of a gonorrhœa had a previously normal condi tion of his urethra?

Urethral Stricture is recognized by Prof. Sands as *a cause* of gleet. What amount of contraction is, then, necessary to constitute a Stricture capable of producing or prolonging a gleet? By the admirable casts of the urethra, which he has presented in his paper, he has, in four specimens, demonstrated a difference in the urethra of different individuals. These casts (carefully enlarged drawings of which I now present to you) will form an interesting basis for study in reference to what may be said to constitute a Stricture.

In cast No. 1, the walls of the canal are seen to be smooth and quite free from indentations. No. 4 is almost equally so, except within an inch or so from the meatus, where two or three slight indentations are seen. No. 3 shows four or five wrinkles occurring at a point coincident, or nearly so, with the locality of the peno-scrotal angle during life, and correspond with the thickened folds of mucous membrane which

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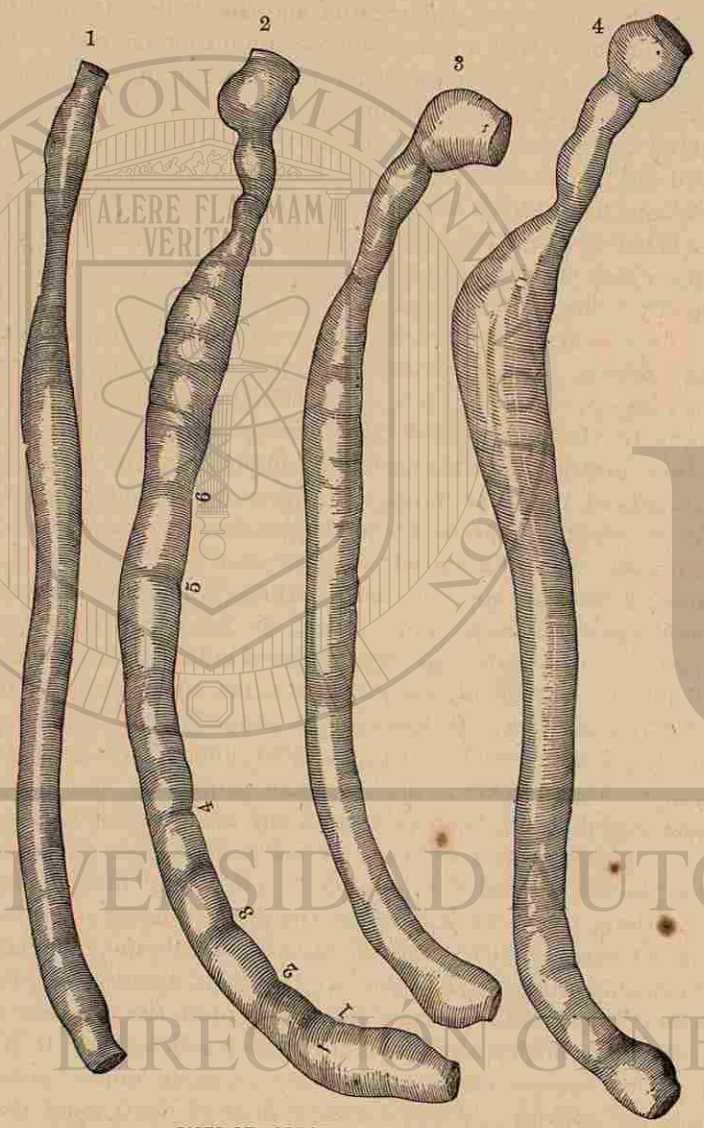
are so commonly found at this point in examinations with



CASTS OF ALLEGED NORMAL URETHRÆ.
(Electrotyped from Prof. Sands's 'Wood-Cut.)

the urethra-metre. No. 2 presents not less than *six distinct contractions* between the meatus and the bulb. It must be borne in mind that a force, of no insignificant character, has been used in the distention of the urethræ from which these casts were taken; and it may, I think, be reasonably presumed that any *accidental* wrinkles would have been straightened out; in short, that nothing but permanent organic contractions would have left their imprint upon the plaster cast.

Whether these can be called Strictures, or not, will depend very much upon what degree of contraction is considered worthy to be called Stricture.

The practical point which this condition suggests, however, is that, whether we call these points Strictures, or contractions, or wrinkles, they are certainly capable of interfering with the smooth and easy passage of urine; that they would furnish admirable points of lodgment for the solid constituents of the urine during an acid or an alkaline dyscrasia —very slight, it may be acknowledged, but very marked when compared with the smooth and regular outline of No. 1. Now, if we can suppose two urethræ, which shall be the counterparts of those from which casts No. 1 and No. 2 were taken, to be invaded by a gonorrhœal inflammation—which of them would, all other conditions being equal, escape with least damage—in which would a gonorrhœa be the least severe; which would be least likely to suffer with subsequent gleet? The urethræ which are represented by these casts were said to have been free from any evidences of disease. when, however, we recall the statement of *Foerster*, quoted by Prof. Sands, on page 7 of his paper, viz., that "blennorrhœa sometimes lasts a very long time without causing any material alteration of the urethral mucous membrane," we may reasonably question the inference that Nos. 2 and 3 were free from disease, while we have ocular proof of the presence of conditions which would favor a contrary conclusion. If No. 2 can be accepted as representing a perfectly normal condition, the smooth and unwrinkled surface of No. 1 must then be acknowledged to vary from it in a very noticeable degree.

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Should it be claimed that the smoothness of No. 1 is accounted for by the less force used in making the injection, we will transfer the comparison to Nos. 3 and 4, which are sufficiently free from contractions to present a striking contrast with No. 2, although in case of these, as nearly as possible, the same force was applied.

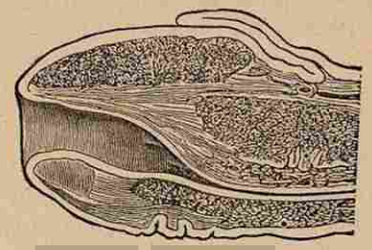
Convinced, as I am, that *complete* freedom from obstruction in the muscular structure of the urethra is essential to the perfect performance of the act of micturition; that *complete* absence of points of friction is necessary to secure the greatest immunity from local and reflex disease, I should no more feel justified in presenting cast or cut of urethra No. 2 as typifying a normal urethra, than I would present a neighboring orifice to you, as normal, when surrounded by the shriveled remains of half a dozen hæmorrhoids.

These casts were claimed to show, among other things, the incorrectness of my views, in regard to the absence, in a perfectly normal urethra, of that boat-shaped dilatation which is described by authors as occupying the first inch of the urethra, and termed the fossa navicularis. Four specimens are rather few to decide a disputed anatomical point, but, as far as they go, they prove the *correctness* of my position. It is entirely absent in No. 1. In No. 2, which is rich in dilatations and contractions, and with a meatus eleven millimetres smaller than any other part of the canal, it is present. In Nos. 3 and 4, if by courtesy it can be said to be present at all, it is within a quarter of an inch of a contracted meatus, and is merely a pouch-like dilatation, which I have always recognized as associated with a contracted meatus, and have never seen in connection with a meatus of the normal size.*

In his discussion of this point, Prof. Sands states that I misquoted *Henle* in reproducing his representation of a frozen section ("Anatomie des Menschen," vol. ii., p. 424). It was the *illustration*, showing that the *normal* meatus corresponded

* Subsequent examinations of urethræ of the fœtus and the newly-born have demonstrated it to be an acquired condition. See statement of Prof. Brown's Researches, page 243.

in size with the urethra behind it, which I quoted—the transcript from a natural frozen section; *which proves my claim*—and *not* his subsequent reiteration of a conventional idea. He has *thrice* presented this plate as a transcript from a normal condition of the penis at this point. The same drawing has been represented, by Drs. Van Buren and Keyes, as a normal condition under the title of "*Vertical Section through Glans and Fossa Navicularis.*"* It corresponds completely with my own numerous observations, on the living subject as well as on the cadaver. What Henle *says* is greatly weakened, if not made wholly valueless, when his own transcripts from nature, as well as the careful observations of others, contradict his statements.



VERTICAL SECTION OF GLANS AND FOSSA NAVICULARIS.

In speaking of examinations in the living subject, Prof. Sands says (p. 162), "In practice, we find, in the size of the meatus, a rough test for the calibre of the urethra." This has long been taught by authorities, and has been adopted by many surgeons as a guide for estimating the calibre of the deeper urethra. The idea may almost be said to be *prehistoric*, and possibly occurred to Adam on his first urination. If our great progenitor could have been examined with a bulbous sound, I doubt not that *his* meatus *would* have been found to correspond completely with the canal behind it, and hence, at that period (if man may then be believed to have been in physical perfection) the meatus would have proved an exact guide to the normal calibre of the urethra. When I now meet with such a case, I consider it the highest normal type of meatus. But, since then, indiscretions and other irregularities have crept into the world; and now, after six or more thousand years, the result is, that the meatus, among other things, has varied from its original type, so that, at the

* "Genito-Urinary Diseases, with Syphilis," page 30.

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present day, if we accept the size of the meatus as a rough guide to the size of the urethra, we shall find it a very rough guide indeed. The fact is, that the meatus can be shown to be perfectly *inconsistent* in its relations to the urethral calibre, and that in not more than one case in ten does it occur that the size of the meatus is a reliable test of the size of the urethra. In the examination of one hundred living subjects with the urethra-metre—

1	was	13	mm. cir.	3	were	25½	mm. cir.
3	were	15	"	4	"	26	"
1	was	16	"	5	"	27	"
2	were	17	"	3	"	27½	"
3	"	18	"	2	"	28	"
3	"	19	"	1	was	28½	"
1	was	19½	"	5	were	29	"
3	were	20	"	3	"	30	"
2	"	20½	"	3	"	31	"
2	"	21	"	5	"	32	"
5	"	22	"	4	"	33	"
3	"	22½	"	2	"	33½	"
1	was	23	"	3	"	34	"
1	"	23½	"	1	was	37½	"
7	were	24	"				
1	was	24½	"	100		24.72	
17	were	25	"				

Average size in one hundred cases, 24.72.

In no case was the urethra, in the one hundred cases, below a calibre of 26 millimetres—ranging from this to 39—the average being 32.95. I think, then, that we are forced to conclude that the size of the *meatus urinarius externus* is not in any sense or degree a guide to the urethral calibre.

It is worthy of remark that, in the one hundred examinations referred to, notwithstanding the very great disproportion between the size of the meatus and the calibre of the spongy urethra, no marked trouble on that account was noted. These were, however, cases which claimed to be free from inflammatory antecedents. It is probably the fact that, as long as the meatus escapes inflammatory action, it does not become a source of trouble on account of its diminutive

proportions. We may have a meatus from the size of a mere pin-hole to the full size which corresponds with the calibre of the urethra behind it. None can, perhaps, be claimed to be *abnormal*, as long as the functions of the part are well performed; and hence, in the presence of so great variations, it might be difficult to fix upon the *highest normal type* of the meatus urinarius. We find, however, that various and grave difficulties and diseases are occasionally associated with a genito-urinary apparatus, where the meatus is not of the full size of the canal behind it, and that such difficulties are promptly relieved by a surgical procedure which permanently enlarges the meatus to that size. The fact that such difficulties do not occur, when the meatus is of the full size of the canal immediately behind it, gives additional weight to the assumption. That condition, then, of these parts which insures the most complete functional integrity, and is least liable to become a source or seat of disease, and which is also least liable to induce, aggravate, or prolong disease in the contiguous parts, may, I think, be safely and appropriately accepted as representing the *highest normal type*. Now, by observation of the one hundred cases reported, the meatus will be found to correspond with the canal behind it, in *ten* cases, while *not one* exceeds this limit. Besides this, it can be most positively proved that contracted meatus prolongs and intensifies gonorrhœa, produces gleet, and is the source of varied and grave reflex irritations.

Profs. Van Buren and Keyes (p. 92) boldly state that "an individual with an average-sized penis, whose meatus will take only eight or nine (fourteen or fifteen F.), has *Stricture* (congenital) of the meatus, although he never may suffer any inconvenience therefrom." Prof. Gouley (p. 103, "Diseases of the Urinary Organs") states that the proportion of Strictures in this region, as compared to the entire number he has seen, is at least 30 per cent. Thus it stands: individuals *may* have a meatus, strictured more or less, and never suffer any inconvenience therefrom; again, this condition *may* give rise to grave trouble. Why this apparent difference?

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Simply, as I apprehend, that when the muscular structure of the meatus, and the urethra behind it, is in perfect condition, it is enabled to empty the urethra completely after urination. Let inflammatory action be set up in this locality, as may occur from extension of an infantile or an adult balanitis, or from gonorrhœa, or from any other cause, and a plastic exudation results, which, becoming organized, disables the urethral muscular structure at this point, and it is no longer able to act efficiently in expelling the last drops of urine; they are retained, a dribbling results, and is the unvarying sign that such an accident has occurred. It is from this cause that the discharge from a gonorrhœa is retained, aggravating and prolonging the disease. Now, the only rational remedy, in this class of cases, is to relieve the obstruction: we cannot restore the disabled muscular structure, but we can relieve the obstruction, mechanically, by making the orifice to correspond with the size of the canal behind it, and thus enable the urethra to clear itself of its irritating secretions.

But Prof. Sands says: "The practice of slitting up the meatus is injurious and irrational," that "the normal meatus is narrow, and its size favors the projection of the stream of urine during micturition." It is not the *normal* meatus that requires any slitting, or any other operation; it is the division of the *abnormal* meatus—disabled through antecedent inflammatory action—which a *rational* treatment demands. I venture the assertion that thousands of cases of gleet exist today, which have been treated by copaiba, and constitutional remedies, and injections varied and frequent, and even by full-sized bougies, for years, and vainly, which this comparatively simple operation (of removing the obstacle to the complete emptying of the urethra) would promptly accomplish, besides affording immunity from recurrence, except through a fresh contagion.

But gleet, troublesome as it is, is by no means the only untoward result possible from a contracted meatus. This point is admitted by physiologists to be a sort of telegraphic

depot for the whole genito-urinary system. Nor is it the genito-urinary system alone which may suffer from irritations of this locality. You have but to recall the fact, that a lascivious thought will cause a sensation at this point, and that slight irritation here will induce the sensuous thought. Depression of spirits, especially in youth; incontinence of urine; pain on ejaculation; neuralgias of the testicles, over the pubis, down the thighs, and even to the soles of the feet; spasmodic Stricture, with or without retention of urine; prostatic irritation and enlargement; inflammation of the bladder and testicle—are each capable of being produced by this condition, in certain instances, as proved by the prompt disappearance of these troubles (often ineffectually treated by other and various means) through a free division of a contracted meatus. My paper on "Reflex Irritations throughout the Genito-Urinary Tract," read before the New York Academy of Medicine in February, 1874, adduces no less than nineteen representative cases of this sort, with all the particulars of antecedent and subsequent conditions. In the London *Lancet* of January 29, 1876, Mr. Furneaux Jordan, F. R. C. S., Professor of Surgery, etc., of Birmingham, England, in speaking of the possible influence of a contracted meatus, writes thus: "I not unfrequently meet with the cause and its results. In boys a common result is cystitis, simulating stone in the bladder. Boys, however, often escape notable trouble; as men they are not let off so easily. With the cares, indigestion, gout (disguised or open), and other ailments, which increase the acidity of the urine, there come one or several of the results of Stricture. One such effect is *urethritis*, which, by continuous extension, may lead to *prostatitis*, or *cystitis*, or *epididymitis*. There are some," he says, "who under such circumstances would affirm that the urethral inflammation had been caused by contact with some noxious fluid. . . . I will not," says Prof. Jordon, "here discuss the merits or demerits of a policy of uniform incredulity. My answer is this: often in cases of diminutive meatus, the bladder is affected first, then the prostatic urethra; then per-

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haps the inflammation may extend along the vas deferens, setting up consecutive orchitis, and from first to last there is no urethral discharge.* Frequency of *micturition; supra-pubic pain; mucus* or *blood* in the urine; are, singly or combined, the subject of complaint. . . . A *diminutive orifice* aggravates and prolongs a *gonorrhœa* or gleet or *Stricture* and their ordinary *sequelæ*. The treatment," he says, "which I adopt for a small meatus is an incision—the result in all cases —a large number—*successful*. The success is not always rapid, especially in old-standing cases of cystitis; but, sooner or later, relief follows."

Sir Henry Thompson says: † "I have given complete relief to distressing symptoms of very long continuance, the cause of which was not suspected, by dividing an external meatus which, nevertheless, admitted a No. 6 English catheter;" and he cites three cases when the very simple operation necessary had given complete relief to symptoms "which had long been regarded as of very obscure character." Now, if such troubles can be adduced as the possible effect of a contracted meatus, and such results can be shown by its division can it be justly said that slitting a contracted meatus is *irrational?*

Prof. Sands (quoting from one of my papers on "Stricture of the Urethra") says: "If a urethra present, the normal calibre of which is equal to a circumference of 30 millimetres, and only a 29 bulbous sound will pass, without detecting obstruction, then the urethra is not 'about right.' It is strictured to the extent of one millimetre, and can never be a healthy urethra while that Stricture remains." Then he says, "Let us inquire if these statements can be verified; if so, we shall find established an important principle in the treatment of gleet." The question of the measurement of the urethral calibre, which is involved in the statement quoted, is one of so great importance, that I shall not apologize for entering upon it with some degree of minuteness. As a mechanical

* "Stricture of Urethra," second London edition, p. 249.
† Ibid.

proposition, there is no room to doubt but that, if the canal, that is, the ante-bulbous urethra, is 30, and 29 only will pass without detecting obstruction, obstruction certainly exists. This, however, as I apprehend, is not the point in dispute, but it is as to whether this minute obstruction, in the first instance, if present, can be made out, and in the second, if made out, can it prove a cause of trouble. The first point, then, to consider, is, What do we understand by the normal calibre of the urethra? In order to settle this, and to meet the objections which have been urged against my own views on this subject, I will present briefly the method and results of urethral measurements by accepted authorities. From the year 1854 to 1875, Sir Henry Thompson taught that, "when 8 or 9 of the English scale could be passed easily through a given urethra, no Stricture could be said to exist." In one of his recent lectures delivered at the University College of London, November 18, 1875,* he says: "Simply take a flexible English gum-elastic bougie, well curved toward the point, with a blunt end, not larger, as a rule, than 10 or 11 of our scale (that is, nineteen or twenty millimetres in circumference), and pass it very gently and slowly into the bladder. If it goes easily, above all, if it is drawn out without being held, and slides out with perfect facility, take my word for it he has no Stricture, and *quoad* obstruction, wants no use of instruments whatever." It will thus be seen that Sir Henry Thompson fails to recognize the varied capacity of the urethra in different individuals, and practically reduces all urethræ to a common and fixed standard. It will also be observed that, within the last year, he has raised this standard from "8 or 9 English" (17 and 18 F.), to "10 or 11" (19 and 20 F.), that is to say, *about two millimetres*. Why he has done so does not appear.

Now, Sir Henry Thompson distinctly states that "in the living body the walls of the passage are closely applied to each other in a state of inaction, so that the diameter is only calculable when distention occurs from some cause . . . . In-

* Reported in the London *Lancet*, December 11, 1875.

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deed," he says, "the question of the diameter of the urethra must be considered as resolving itself, to a certain extent, into *the measure of its capacity of being extended*, and this is of greater practical importance than the mere width of the mucous membrane, when slit up after death;"* and yet Sir Henry fixes the urethral limit at 10 or 11 English, without the least reference to these facts.

Prof. Sands says that "we have properly the *normal* calibre of the urethra, *when it is moderately distended by urine during normal* micturition," and, although he remarks, "we cannot estimate this with accuracy, *I believe that it is not very large.*" That is to say, it does not, in his estimation, make a calibre of more than twenty-five millimetres. He says, "*Finally, passing sounds exceeding twenty-five millimetres is very rarely necessary, either for the diagnosis or treatment of Strictures of the urethra.*" Prof. Sands thus virtually fixes the urethral calibre at *twenty-five millimetres.* Twenty-five millimetres are equal to 14 of the English scale. We are not informed why Sir Henry Thompson first fixed the urethral limit at "8 or 9," nor why he subsequently granted an extension to "10 or 11;" nor yet why Prof. Sands is willing to allow a calibre of 14. There is no evidence to show that these estimates are based upon any well-ascertained facts bearing upon this point. Profs. Van Buren and Keyes say (page 28 of their excellent work on venereal diseases,† and in italics), "*A fair, average, well-formed urethra measures about three-eighths of an inch in diameter;*" that is to say, thirty millimetres in circumference. The French school (as represented by Dr. T. B. Curtis, of Boston, in his essay which won the Civiale prize in 1873, and has thus the stamp of approval by the French Academy) says, "*The size of the human male adult urethra is seven millimetres in diameter,*" or 21 of the French scale.

The late Mr. Guthrie, so much appreciated as a surgical authority, both in Great Britain and America, says, "The

* "Stricture of the Urethra," Thompson, second London edition, p. 6.

† "Genito-Urinary Diseases," etc., p. 28.

urethra varies so much in different people, that it is scarcely worth inquiring into, particularly as the passage of instruments is always regulated by the size of the orifice;" . . . . but, as to its *positive* size, he says: "I have a solid bougie which is rather more than half an inch (twelve and a half millimetres) in diameter. I had it made for one gentleman in particular, and it passed with perfect ease through the whole passage . . . . Very few urethras," he further remarks, "will admit a sound of more than 12 to 16."

In view, then, of this apparent want of harmony (not to say definiteness), in arriving at a practical estimate of the normal urethral calibre, we must, I think, come to the conclusion that the authorities quoted must have taken *the size of the meatus, the volume of the stream*, the *results of post-mortem examinations*, and the *experiments on the extensibility of mucous membrane*, as a basis, and have struck a general average as to what ought, in their opinion, to constitute a normal urethral calibre. In summing up these independent, individual estimates, we find them as follows:

Sir Henry Thompson (10 to 11 E.) up to 19 or	20	millimetres.
The French School	21	"
Prof. Sands up to	25	"
Profs. Van Buren and Keyes	30	"
Mr. Guthrie up to *over ½ inch diameter* . about	40	"

Now, in a urethra of a calibre of 30, an instrument of 19 or 20 ("10 or 11" English) would pass a Stricture of ten millimetres' value without discovering it; one of twenty-five millimetres would fail to appreciate a Stricture of five millimetres' value or one-sixth of the entire calibre of the urethra; and should the normal calibre reach the size of 40, which it can be proved to do by Mr. Guthrie and myself, in rare cases, even an instrument of *thirty* millimetres in circumference would fail to detect a Stricture involving *one-fourth* of the passage. It would, then, appear to be a matter of some importance, for a person suffering from symptoms of Stricture, to ascertain the probable size of his own urethra before apply-

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ing to a surgeon for aid; otherwise, he might apply to a disciple of the English school, who would not allow him a calibre of more than 19 or 20 ("10 or 11" English); or to a French surgeon, who would concede only 21; or to one who believes, with Prof. Sands, that "more than 25 is rarely necessary for the diagnosis or treatment of Stricture;" for all these would certainly fail to detect, much less be able to appreciate, the extent of a Stricture, above their estimates, in a urethra which should reach the fair average of the normal urethra of our more generous American authority, to say nothing of the possibilities of a urethra of the size of about forty millimetres in circumference, cited by that grand old English surgeon, the late Mr. Guthrie.

The conclusion is, then, forced upon us, that some method of arriving at an estimate of the normal urethral calibre must be adopted, which shall eliminate, as completely as possible, the element of individual opinion based upon generalities. The clear and practical view of Sir Henry Thompson, that "*the question of the diameter of the urethra must be considered as resolving itself into the measure of its capability of being distended,*" furnishes us with the only rational basis for a true appreciation of the urethral calibre in different individuals. Through a very great number of experiments, upon subjects living and dead, during a period of more than four years, the possibility of arriving at correct and uniform measurements of the urethral canal, by means of this instrument, the *Urethrametre* (which has already been described to you by Prof. Sands), has finally been demonstrated. By means of this it has been found possible to determine (and with scarcely more discomfort than would result from the introduction of an ordinary sound or bougie) the *limit* of easy distention, and thus the *normal calibre* of urethræ, within one or two millimetres in almost every case. In a great proportion of one hundred cases, recently examined, this limit was defined *exactly;* and this without regard to the contractions of the meatus, or the presence of Strictures above 13 F., which is the size of the closed instrument. My examinations with the

urethra-metre have been, from the first, conducted with an entire knowledge and appreciation of the physiology and histology of the penis and urethra, as taught by authorities. It was fully recognized that the calibre of the urethra varied, anatomically, in different parts. The instrument was introduced, closed, to the bulbo-membranous junction, and then expanded slowly, until a feeling of *slight fullness* was experienced *by the patient*. If, *then*, it was *easily* and *painlessly* movable, it was drawn gently forward, and, if no positive obstruction was met, the urethra was considered free from Stricture. If, however, it was arrested at any point, the instrument was turned down until it could pass, and the amount of obstruction was noted from the dial. If the holding was slight, and at a point of usual anatomical narrowing, it was not considered important, unless the instrument was distinctly resisted on being pushed back at such point.

After making a great number of examinations, I was led to appreciate an important difference in the calibre of different urethræ, and that an average standard was impossible. That while thirty millimetres was the full measure of one man's urethra, that of another would as freely admit a No. 40 solid sound through its entire length, and into the bladder.

Another point, and one which has attracted some, but not sufficient, attention, was that of the proportionate relation, which I came to observe, between the size of the urethra and the penis with which it was associated. After an extended experience on this point, I am prepared to state that this relation is constant, and is about 1 to $3\frac{1}{2}$; in a penis of three inches circumference the urethra would be 30, $3\frac{1}{4}$ 32, $3\frac{1}{2}$ 34, $3\frac{3}{4}$ 36, 4 38, $4\frac{1}{4}$ to $4\frac{1}{2}$ 40; and that an estimate of calibre made on this basis is a valuable guide when the urethra-metre is not available. It must, however, be borne in mind that the circumstances under which examinations are made occasionally (though seldom) vary, and that some experience is necessary in order to recognize and appreciate the conditions which temporarily affect these relations.

Even late authorities state that a large penis may be as-

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sociated with a small urethra, and that a small penis may accommodate a large urethra. This important statement will be proved untrue by the results of my examinations.

Out of the one hundred cases presented in the annexed tables, the size of the urethra corresponded with the size of the penis, exactly in accordance with my claim, in thirty-nine cases:

		39	cases.
Deviating from it	1 millimetre,	36	"
" "	2 millimetres,	17	"
" "	3 "	2	"
" "	4 "	1	"
" "	5 "	3	"
" "	6 "	1	"
" "	7 "	1	"
		100	"

On page 21 of his paper, Prof. Sands relates *his* experiments with the urethra-metre. I am not surprised that, from his experience in *twenty* cases, he should arrive at conclusions on some points somewhat at variance with my own. The urethra-metre is an instrument which, like the *stethoscope*, requires a familiarity with its use, for which no anatomical knowledge, or dexterity in the use of other instruments, can fully compensate. The tactile skill which is required to appreciate the least amount of distention which urethral mucous membrane will bear, without damage, and yet shall give the assurance of its full expansion, will bear comparison with the appreciation of the *true respiratory murmur* in a chest-examination. Prof. Sands did find, however, that the instrument showed variations, in different localities of the urethra, corresponding with those which he had previously demonstrated on the dead subject. He says, "If the above facts can be verified, they prove indubitably that the assumption of an unvarying calibre for any urethra is unwarrantable; and it is plain that such an assumption must lead to the gravest errors in practice."

Now, I, for one, am sure that "the above facts" *can be verified*, and I most cordially agree with Prof. Sands in his

statement, as to the error of considering the urethra of unvarying calibre, as well as in regard to probable consequences of such an error. This is *the* error which is practically made by those who estimate the calibre of the urethra by the size of a bougie, and *not* by any one who makes an intelligent use of the urethra-metre. Prof. Sands has misapprehended me when he infers that I am accustomed to take the calibre of the bulbous portion of the urethra as a *measure* of what all parts of the urethra in front of this portion "ought to be."

The passage quoted from my article on gleet, etc., from which this conclusion is drawn, is as follows: "At this point (the bulbo-membranous junction) the bulbous portion of the instrument (the urethra-metre) is to be expanded by means of a screw at the handle, until a *feeling of fullness* is experienced, when, if there is no Stricture at the point of trial, the hand on the dial-plate will indicate, *with sufficient certainty*, the normal calibre of the urethra under examination."* The *feeling of fullness* spoken of, referred, in my mind to the *sensation* of the *patient;* and this I found was experienced, as a rule, before the true capacity of the canal, at that point, was reached; from the extreme sensitiveness which exists in some cases, the sensation of the patient affords no reliable guide in ascertaining the calibre of the ante-bulbous portion, with the urethra-metre. This abnormal sensitiveness is rarely present at the bulb, and thus the instrument, raised to a point occasioning a feeling of fullness to the patient (and not one of arrest to the operator) indicated, "with sufficient certainty," the calibre of the ante-bulbous urethra, and not the size of the bulbous urethra, which authorities state, and I then fully believed was, as a rule, much larger.

My meaning was perhaps not as clearly expressed as it should have been, but the errors which might arise from the impression that the bulbous and ante-bulbous portions are of the same size are perhaps not so great as Prof. Sands intimates, or as I myself would have premised, before making my

* "On Gleet and its Relations to Urethral Stricture, American Clinical Lectures," p. 253, by F. N. Otis, M. D.

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recent urethral measurements of one hundred cases of supposed normal urethræ.

In these, the measured difference between the bulbous urethra and the part anterior to it was—

In	35	cases	1	millimetre.*
"	21	"	2	millimetres.
"	18	"	3	"
"	6	"	4	"
"	2	"	5	"
"	2	"	6	"
"	2	"	7	"
"	1	"	11	"
"	13	"		no difference.

The average difference in the one hundred cases was $2\frac{5}{100}$ millimetres, and the calibre of the anté-bulbous portion averaged 32.95.

In my previous report of one hundred cases, in a paper read before the State Medical Society in February, 1875, and which were examined with the view to detecting Stricture, and not to ascertain the normal calibre, the average calibre was $31\frac{1}{2}$. The difference of about two millimetres in the average of the first and second hundred cases may, I think, be accounted for by the more rigid, thorough, and methodical carrying out of the plan of measurement in the more recent examinations. In this connection, as opposed to the traditional idea, it will be interesting to quote the opinion of that eminent English surgeon, the late Mr. Guthrie, who says:

"This bulbous portion of the urethra is said to be larger than the anterior part, but I do not believe that it is, *although it may appear so.*"

Perfect security against mistaking a normal narrowing for Stricture may always be had, by examining *from before backward*. If the canal anterior to the contraction is of distinctly larger calibre, this localized contraction must be accepted as a Stricture. I recognize the elements of doubt, as to the cause and nature of localized urethral contractions, in some cases, especially as *post-mortem* examinations often do not

* 1 millimetre equals $\frac{1}{25}$ of an inch.

show any lesion of the mucous membrane over a point where Stricture has been recognized during life. Various conditions, resulting from persistent irritation of mucous membrane, may obtain, which are capable of causing changes—possibly atrophy, with contraction of the trabecular structure of the corpus spongiosum, or obliteration of its meshes, and which might escape the observation of those who were looking only for cicatricial deposits. One thing is certain, that the subject has not yet received, from our microscopical experts, the attention its importance demands. The practical fact, however, remains, that whatever permanently constricts a localized portion of any urethra is practically a Stricture, and capable of causing the effects of Stricture, and is also amenable to the same method of treatment.

The value of the examinations of one hundred cases,* repeatedly referred to during the course of this paper, will be better appreciated by a knowledge of the circumstances under which they were made. The subjects of examination were, some in my own wards in Charity Hospital, others, through the courtesy of my colleagues, Drs. Keyes, Howe, Piffard, and Frankel, were selected from their wards. Quite a large proportion, fully one-half, were patients in Bellevue Hospital, kindly placed at my disposal by my friends Profs. Sands, Stephen Smith, and Dr. Erskine Mason.

The examinations were conducted by me, in the presence and with the assistance, on different occasions, of Drs. Stephen Smith, George A. Peters, F. J. Bumstead, H. G. Piffard, L. Bolton Bangs, W. T. Bull, and various members of the house-staff of Charity and Bellevue Hospitals. In the accompanying tables the names of the gentlemen, as far as possible, are associated with the cases examined or reviewed by them. In three of the cases, a reëxamination was made after death; two cases, in the presence and with the assistance of Dr. Stephen Smith, Dr. A. Jacobi, and Dr. L. Bolton Bangs; and the third in the presence and with the assistance of Dr. Freeman J. Bumstead, Dr. George A. Peters, and Dr. Bolton

* Tables at page 200.

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Bangs. In the first two the reëxamination was found to accord completely with that made during life; in the third, the distensibility of the bulbous urethra was increased four millimetres; but the measurements in the anterior portion of the canal and size of the meatus remained the same. The measurement of the flaccid penis, in each case, was less by one-quarter of an inch than during life; but as, in the former, the measurement was made after the removal of the integument, it so far shows that the measurement of the flaccid penis during life does not differ greatly from a *post-mortem* measurement.

The results of examination were carefully noted by my friend and associate Dr. L. Bolton Bangs, whose sole office it was to record them. The tabulation, which is appended, was also made by him, solely, and has been subjected to no revision by any other person.

In regard to the case of fourteen Strictures (reported by me to one of our medical societies, and subsequently published in the New York Medical Journal of April, 1874) referred to by Prof. Sands, I desire to protest against this grave accident to my patient being brought forward to discredit the results of my method of examining the urethra, especially so, as this warrants the inference that I am in the habit of discovering and operating upon Strictures that do not exist. I am aware of the claim of Sir Henry Thompson, that rarely more than three or four Strictures occur in a single urethra. Pursuing the same general mode of examination, it is not difficult to appreciate the incredulity of Prof. Sands in regard to the existence of fourteen Strictures in a single urethra. If a man thrust his hand into a fire, there will be no dispute but that he may have, resulting, as many scars as he has received burns. In the same way there can be no limit to the number of urethral scars, which become Strictures, except by limiting the degree and continuance of the gonorrhœal, or other fire, which has inflicted the primary injury.

This drawing, which was presented, in company with the

living subject, before the New York Medical Journal Association early in 1874, is a fairly correct diagram of the number, size, and locality of the fourteen Strictures. They were made out by me, on several occasions, before the operation, and at the time of the operation these measurements were rehearsed and confirmed, under æther, by Dr. George A. Peters and Dr. Deforest Woodruff, who assisted me during the operation. The Strictures were found, in a penis of three inches, to vary from twenty-two millimetres to one-third of a millimetre, and extended to 6½ inches, beyond which the urethra was practically impermeable. The perineal section was performed for the posterior Strictures, and dilating urethrotomy for those anterior. The Strictures were, with the exception of three bands deep in the perineal urethra, made out with the bulbous sounds; the latter were recognized in the passage of the Maisonneuve blade, by me, and distinctly appreciated by Drs. Peters and Woodruff.*

I was more than gratified to learn, from so able a surgeon as Prof. Sands; from one who so thoroughly enjoys the confidence of the medical profession and of this community and country, that he thought so well of the operation of internal urethrotomy. "Some of the most gratifying results in modern surgical practice," says Prof. Sands, "have been achieved by this method. But," he continues, "I believe it applicable chiefly to the treatment of close Strictures, and as an auxiliary to dilatation." I could have wished that he had accorded to this operation of internal urethrotomy, so highly commended, a broader scope. Prof. Sands announces himself as "a firm believer in gradual dilatation." For my own part, I can only consider gradual dilatation of Stricture, (except so far as it may be necessary to prepare the way for urethrotomy,) in the light of a temporary expedient, and would use it, only as I would temporize with a vesical calculus, with demulcents and sedatives, when the condition of the patient was such as to forbid the use of the scalpel or the lithotrite.

See diagram showing locality of the fourteen Strictures in the case of W. C. H., page 63.

I fully recognize the responsibility of so pronounced an opinion on this important matter, and I trust that, during the discussion which is to follow, some sound reasons will be adduced to show why *urethrotomy* should be confined to grave and close Strictures; why a resilient urethral obstruction should be made the subject of oft-repeated stretchings—never without risk, and perhaps for a life time—instead of the prompt, rational, and what appears to me the more surgical, treatment by *division*. Is it his fault, or that of his surgeon, that the subject of a gleet is so often made to pay a wearying tribute to one member of our profession after another, until at last he drops into the clutches of that class which Sir Henry Thompson so graphically describes as hanging on the outskirts of our honorable profession: who will extort his last dollar in exchange for a placebo. I believe it can be proved, that every gleet is the result of Stricture, and that it is a true and safe economy to search it out in its inception—to divide it, and thus promptly restore the urethral calibre to its integrity, and *before* the damage it may occasion has implicated tissues and organs to an extent which may imperil life. Every Stricture is a mortgage bearing compound interest, and the wise man will promptly pay it off. Every gleet is a call for payment. You may for the time, with syringe and bougie, drive off this implacable, persistent dun, but he will return, in one guise or another, until the debt is paid, or the property is forfeit."

*Discussion following Dr. Otis's reply to Prof. Sands:**

Dr. Weir proceeded to discuss the question under two heads:

1. What is the size of the normal urethra?
2. What are its normal contractions?

His conclusions were:

1. That the spongy portion of the urethra is the smaller and least distensible.

* As reported in the N. Y. Medical Record of March 6th, 1876.

2. That a healthy urethra can be distended in its spongy portion to admit 32 to 33 mm., French scale.

3. Normal contractions frequently exist as small as 29 mm. in the spongy portion.

4. The normal size of the meatus varies from 18 to 28 mm.

5. That the urethral canal is narrowed at the meatus, dilated in the glans, slightly narrowed at the termination of the fossa navicularis, and then is nearly uniform in size through the spongy portion, again enlarges at the bulb, etc.

Dr. Weir, in the course of his remarks, referred to cases in which there were evidences of Stricture during life, but no evidences were found by microscopical examination after death.

Dr. Bumstead remarked that there were many questions in connection with the subject under discussion upon which he wished to have further light and more experience before venturing an opinion upon particular points. The truth in the case has probably not yet been found. But with reference to gleet and organic Stricture the doctor expressed a doubt whether the former invariably depend upon the latter. He was not able to see any reason why we should not look for causes of a gleety discharge in a granular condition of the mucous membrane, hyperæmia at certain points, such as are seen in chronic conjunctivitis or inflammation of other mucous membranes.

With reference to the use of the urethra-metre, Dr. Bumstead regarded the feeling of fulness alluded to as a somewhat uncertain index, for it depends very much upon the sensibility of the patient and also very much upon the care exercised by the surgeon. Dr. Bumstead agreed with Dr. Otis, and accepted the measurement of the central portion of the spongy portion, it being the least distensible, as the fairest index of the size of the urethra. How far that measurement corresponds to the size of the penis, he was not prepared to say, although from the limited number of examinations he had made, they had so far corresponded that he was willing to accept the statements made by Dr. Otis on this point.

With regard to the size of the meatus, Dr. Bumstead dif-

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fered with Dr. Sands, who regards it a rough test to the calibre of the urethra, and considers the freaks of nature in this direction, quite as constant as with regard to the length of the penis. We should never be tempted to take the size of the meatus as the index of the calibre of the urethral canal. He was of the opinion that, as a general rule, the meatus is smaller than the calibre of the urethral canal itself, and does not hesitate to divide it, either for purposes of dilatation or for the purpose of passing instruments other than dilators.

With regard to internal urethrotomy for the cure of urethral Stricture, as compared with dilatation, his experience had differed from that of Dr. Sands, and he did not regard dilatation as the best means to be employed. It is well known how unsuccessful the treatment by dilatation has been, for Strictures subjected to dilatation have recurred time and time again, and that was the rule and not the exception. He had obtained much better results by internal urethrotomy, than by dilatation or by rupture. Some years ago Dr. Bumstead was in the habit of treating urethral Strictures by the use of Holt's divulsor, but latterly he has discarded this method of treatment almost entirely. For the treatment of Stricture in the anterior portion of the urethra, internal urethrotomy is rarely productive of harm, and has a great superiority over ordinary dilatation. He had also found that internal urethrotomy, when carried to a considerable extent has, in his hands, been productive of better results than when carried to a lower degree. Reference was made to several cases which had been cut so as to receive 26 French scale, and in the course of six months had so contracted as only to admit 14 or 15 of the same scale. These cases, cut a second time up to the same point, contracted a second time, and so on; so that during the last two or three years it has been his custom to cut up to 35 and 40 French, and the tendency to contraction has been much less than before. The same may be said with regard to the habitual use of very large sounds.

With reference to the statement made by Dr. Sands that instruments larger than 25 mm. were rarely necessary for purposes of treatment or diagnosis, he did not believe it could be carried out in practice. He was of the opinion that sounds larger than 25 mm. were constantly required in practice, and he should not feel satisfied if he restricted himself to that size.

With regard to slitting up the meatus, he was of the belief that it was done altogether too much, as well as cutting the urethra elsewhere, especially by the inexperienced. But he had seen no ill results from slitting the meatus, and did not hesitate to resort to the operation if necessary to effect the passage of an instrument. "I will say," adds Dr. Bumstead, "as I commenced, that the truth with regard to this matter under discussion is yet to be arrived at. The subject requires further investigation before we express a full and decided opinion as to exactly how far dilatation of the urethral canal should be carried."

Dr. George A. Peters, commenting upon the cases in which he had assisted Dr. Otis in making the measurements, remarked that he was surprised at the uniform correspondence between the actual measurement of the urethra and that called for by the circumferential measurement of the penis, the variation not being more than 1 or 2 mm. When using the urethra-metre he does not depend upon the sensations of the patient with reference to the distance to which the blades can be separated, but trusts to his own sense, and gives them sufficient separation, so that the instrument is barely grasped by the urethra without distending it unduly. At the meatus the instrument must be reduced in size two or more millimetres before it can make its exit, if it has moderately distended the canal before reaching that point.

With reference to slitting the meatus urinarius, he has had no trouble or fear in resorting to the operation, and has found it very essential for the purpose of perfecting the treatment of Stricture, and sometimes for the absolute diagnosis.

He has failed sometimes in affording any relief when the meatus has been slit for the cure of what was supposed to be reflex trouble, but has never seen any actual harm arise from the procedure.

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With reference to the use of instruments, the doctor remarked that he had carried them up to 35, sometimes 40, and was confident that he had obtained more permanent benefit than when they were carried only to 25 or lower.

With reference to the question of internal urethrotomy he agreed with Dr. Bumstead in the statement that it was to be relied upon for the treatment of Stricture of the urethra rather than dilatation or rupture.

Dr. Keyes remarked that the fact that the urethra can be distended to very great dimensions has been known for a long time, but that this fact has any practical importance has not been shown.

So also the urethra will permit of extensive cuttings; but these, together with excessive dilatations, have fallen into disuse, thus showing that the profession has declared itself against extreme measures in these directions.

That the rectum can be dilated sufficiently to admit a man's hand, and the female urethra so dilated as to readily admit the index finger, does not necessarily make it the most judicious method of obtaining admission through these openings. Why any difference should be made respecting the male urethra he was not able to understand. That the measurements vary very greatly has been shown by the figures of every observer, and these variations which have been found in the calibre of the urethra, are enough to disprove the value of any instrument for its measurement beyond certain reasonably high limits. If anybody could establish the absolute calibre of this canal it would be valuable, but it seems difficult to obtain such a standard.

In the treatment of gleet by dilatation the doctor recommended that instruments below rather than above 30 mm. in circumference should be used, and stopped when the symptoms disappear. Dr. Keyes remarked that he had not used a sound for this purpose above the size of 36, and that size was used only once, and in a patient who had an exceptionally large urethra and penis. The symptoms of gleet cease almost always after the use of instruments below 30. In the

anterior portion of the urethra internal urethrotomy is better than dilatation in the treatment of Stricture. In the deeper portions of the urethra Stricture does not yield to internal urethrotomy so readily.

Traumatic linear Strictures are best treated by external section. And so it is; no fixed rules can be given with reference to the treatment of Stricture, but every case must be studied by itself. To establish measurements, therefore, upon fixed standards which shall decide delicate questions with reference to operative interference or general treatment are apt to do more harm than good.

The discussion closed with the remarks of Dr. Keyes.*

Following are the tabulated measurements of 100 supposed normal urethræ referred to during the previous discussion.

* Dr. Keyes was associated with Prof. Wm. H. Van Buren in the preparation of their valuable work on Genito-Urinary Diseases with Syphilis, published by Appleton & Co., 1874, but little more than a year previous to this discussion. By reference to page 28 of that work (and to page 83, of this) it will be seen that Messrs. Van Buren and Keyes state emphatically that "a fair average well formed urethra measures about three-eighths of an inch in diameter (*i. e.* 30mm. circumference).

This estimate, (much greater than any before published, except by myself) was based either upon the published results of my observations or upon measurements with the imperfect means in use before my invention of the Urethra-metre. It varied only $1\frac{84}{100}$ mm. in circumference (less than $\frac{1}{15}$ diameter) from the results of my actual measurements made with the most perfect mechanical accuracy, as published in March 1875, and quoted on page 178 and on page 72, 1874. Why the use of instruments, in the treatment of gleet by dilatation, *below*, 30 mm. (previously claimed by him to be the average size of the well formed urethra) should be recommended was not explained.

The suggested *reductio ad absurdum* (in Dr. K.'s opening remarks), by comparison of simple measurements of the male urethra with introduction of the hand into the rectum, or the finger into the female bladder, lost its point when it was considered that mechanical measurements, without force, and with mathematical accuracy of results, alone had been claimed—with which procedure the forcible rupture of the sphincter ani or sphincter vesicæ, referred to, had nothing in common. A painstaking experience with a good urethra-metre, say in 40 or 50 cases, will not fail to convince any surgeon of the absolute accuracy of the results claimed for this instrument. In comparison with these results it will also be seen that all deductions from previous estimates and measurements, by other methods, are wholly unreliable.

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MEASUREMENTS OF THE NORMAL MALE URETHRA IN 100 CASES.

No. of case.	Age of Patient.	Antecedent History.	Present Condition, Functions, etc.	Prostate Gland.	Length of Flaccid Penis from Meatus to B. M. Junction. In inches.	Circumference of Penis in inches.	Cal. of Urethra. Mm.	Measurements with Urethrametre. Dis. from Meatus in inches.	Measurements with Urethrametre. Calibre of Urethra. Mm.	
1	28	No Gonorrhœa. Masturbation.	Not examined.		5	3½ =	34	At Bulb = 34 At 4 = 33 From 4 to Meatus = 28 Meatus = 25		1 to 3
2	26	No Gon. Masturbation.	Long Prepuce.	do.	6	3¾ =	36	At Bulb = 38 At 4 = 34 From 3⅛ to Meatus = 35 Meatus = 25		⅛
3	17	No Gon. Denied Mesturbation.	Long Prepuce.	do.	not taken	3½ =	34	At Bulb = 30 At 3½ = 27 At 2½ Strict. by 25 to Meatus = 27 Meatus = 18		
4	28	No Gon. (kicked by horse years ago, occasl. dis. since.)		do.	do.	3½ =	34	At Bulb = 34 At 3 = 33 From 3 to Meatus = 34 Meatus = 24		¾
5	62	No Gon. (?) Masturbation.	Urethra very sensitive. Urinates every 2 h. Dribbles	do.	do.	3½ =	34	At Bulb = 34 From 3⅛ to Meatus = 29 Meatus = 25		3 to 5
6	22	No Gon. (?) Masturbation.	Urinates at night 2 to 3 times. Subject of epilepsy. Dribbles.	do.	do.	3½ =	34	At Bulb = 34 At 4 = 33 From 4 to 2½ = 33 At 2½ Strict. by 20 From 2½ to Meatus = 25		Pus on instrum'nt
7	27	No Gon. Masturbation till 18 years old.	Subject of hemiplegia. Dribbles.	do.	5½	3¼ =	32	From 5½ to Meatus = 32 Meatus = 25		1
8		No Gon. No Masturbation.	Hydrocele left side. Seml. emissions. No dribbling.	do.		3½ =	32	At Bulb = 32 To 2 = 30 At 2 Strict. by 25 Meatus = 22+		
9	50	No Gon. Occasional Masturbation.	No dribbling. Occasional emissions.	not enlarged.	5½	3½ =	34	At Bulb = 35 At 3⅛ = 33 From 3½ to Meatus = 33 Meatus = 33		2

MEASUREMENTS OF THE NORMAL MALE URETHRA IN 100 CASES.

No. of case.	Age of Patient.	Antecedent History.	Present Condition. Functions, etc.	Prostate Gland.	Length of Flaccid Penis from Meatus to B. M. Junction.	Circumference of Penis in inches.	Cal. estim'd from circum. of Penis. Mm.	Measurements with Urethrametre. Dis. from Meatus in inches.	Measurements with Urethrametre. Actual Cal. of Urethra. Mm.	
10	29	No Gon. No masturbation.	Urinates every 2 hrs. and twice at night.	Not examined.	5¼	3¾ =	36	At Bulb = 36+ At 3¼ = 35 From 3¼ to Meatus = 34⅛ Meatus = 22⅛		
11	40	* No Gon. No masturbation.	Very long prepuce.	do.	5	3¾ =	36	At Bulb = 36⅛ At 3¼ = 35 From 3¼ to 2 = 35 at 2 in. 34 det. band From 2 to Meatus = 35 Meatus = 25		Pat. a'd urethritus acq. from w't. with discharge for 3 yrs.
12	74	No Gon.	Cystitis.	enlarged.	5	3½ =	34	At Bulb = 36 At 3⅛ = 34 for 1 inch From 2½ to Meatus = 33 Meatus = 15		
13	39	No Gon.	Occasional seml. emissions.	Not examined.	5½	3¾ =	36	At Bulb = 38¼ At 3½ = 35½ From 3½ to Meatus = 35½ Meatus = 25½		3
14	40	No Gon. No masturbation.		not enlarged. small and soft.	4½	3¾ =	36	At Bulb = 36 From 3 in. to Meatus = 34 Meatus = 33		1 to 3
15	41	* No Gon. No masturbation.	Urinates at night and often during day. Urethra very sensitive.	Not examined.	5	3½ =	34	At Bulb = 35 At 3¼ = 34 From 3¼ to 2 = 34 at 2 = 30 Stricture. From 2 to ½ = 34 At ⅛ = 28 Meatus = 30		Pat. a'd urethritus acquired from wife 7 yrs. 1 to 3.
16	50	No Gon. No masturbation.	Urinates once at night.	2 inches lat. measurement.	5	3¼ =	32	At Bulb = 34 to 2 inches = 34 From 2 to Meatus = 33 Meatus = 15		4
17	56	No Gon. Masturbation.		not enlarged.	3⅜	3 =	30	At Bulb = 31 to 2½ = 31 From 2½ to 1 = 28 at 1 = 27 Stricture. From 1 to Meatus = 28 Meatus = 15		

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MEASUREMENTS OF THE NORMAL MALE URETHRA IN 100 CASES.

No. of case.	Age of Patient.	Antecedent History.	Present Condition. Functions, etc.	Prostate Gland.	Length of Flaccid Penis from Meatus to B. M. Junction. In inches.	Circumference of Penis in inches.	Cal. estim'd from circum. of Penis. Mm.	Measurements with Urethrametre. Dis. from Meatus in inches.	Actual Cal. of Urethra. Mm.	
18	36	No Gon. No masturbation.	Urinates 1 at night.	Not examined.	5	$3\frac{1}{4}$=	34	At Bulb to $2\frac{1}{2}$=36 From $2\frac{1}{2}$ to $\frac{1}{2}$=35 From $\frac{1}{2}$ to Meatus =27 Meatus =27		6
19	49	No Gon.	Urinates 2 at night.	Small. Not over one inch lateral.	$5\frac{3}{4}$	$3\frac{3}{4}$=	36	At Bulb to $3\frac{1}{2}$=37 From $3\frac{1}{2}$ to Meatus =36 Meatus =33		7
20	60	No Gon.	Urinates 3 to 4 times at night. Congenl. Phymosis.	Large. Lateral measurement $2\frac{1}{2}$ inches.	$4\frac{3}{4}$	$2\frac{7}{8}$=	29	At Bulb to $2\frac{1}{2}$=31 From $2\frac{1}{2}$ to Meatus =30 Meatus =24		8
21	30	No Gon.			5	$3\frac{7}{8}$=	37	At Bulb to 3 inches =38 From 3 to $1\frac{1}{2}$=36 From $1\frac{1}{2}$ to $\frac{1}{4}$=34 Meatus =29		9
22	67	No Gon.	Urinates 2 to 3 times at night.	Lateral meas. $1\frac{1}{2}$ inches.	$5\frac{1}{4}$	$3\frac{7}{8}$=	37	At Bulb to 3 =39 From 3 to Meatus =$37\frac{1}{2}$ Meatus =$37\frac{1}{2}$		10
23	59	No Gon.	Urinates once at night.	Lateral meas. $1\frac{1}{2}$ inches.	6	$3\frac{7}{8}$=	37	At Bulb to $3\frac{1}{2}$=41 From $3\frac{1}{2}$ to Meatus =39 Meatus =$33\frac{1}{2}$		11
24	37	No Gon. No masturbation.	do.		5	$3\frac{1}{4}$=	32	At Bulb to 3 =33 From 3 to Meatus =$31\frac{1}{2}$ Meatus =$20\frac{1}{2}$		12
25	25	No Gon. Masturbation.	Urinates 4 to 5 times at night.	Lateral meas. $1\frac{1}{2}$ inch.	5	$3\frac{1}{4}$=	32	At Bulb to $2\frac{1}{2}$=32 From $2\frac{1}{2}$ to Meatus =31 Meatus =21		13

MEASUREMENTS OF THE NORMAL MALE URETHRA IN 100 CASES.

No. of case.	Age of Patient.	Antecedent History.	Present Condition, Functions, etc.	Prostate Gland.	Length of Flaccid Penis from Meatus to B. M. Junction. In inches.	Circumference of Penis in inches.	Cal. estim'd from circum. of Penis. Mm.	Measurements with Urethrametre. Dis. from Meatus in inches.	Actual Cal. of Urethra. Mm.	
26	40	No Gon. No masturbation.	Urinates 3 to 4 times at night and 4 times daily.		$5\frac{1}{4}$	$3\frac{1}{4}$=	32	At Bulb to $2\frac{1}{2}$=33 At $2\frac{1}{2}$=$31\frac{1}{2}$ Strict. From $2\frac{1}{2}$ to Meatus =33 Meatus =13		14
27	24	No Gon.	Urinates 4 times daily, not at night Emissions 2 or 3 every 2 weeks. Troublesome erections nights			$3\frac{1}{2}$=	34	At Bulb to $3\frac{1}{2}$=$35\frac{1}{2}$ At $3\frac{1}{2}$ =34 Meatus =22		15
28	28	No Gon. No masturbation.			$4\frac{3}{4}$	3 =	30	At Bulb to $1\frac{1}{2}$=32 From $1\frac{1}{2}$ to $\frac{1}{2}$=30 Meatus =22		16
29	39	No Gon. No masturbation.	Some dribbling.	not enlarged.	6	$3\frac{1}{4}$=	32	At Bulb to $3\frac{1}{2}$=32 From $3\frac{1}{2}$ to Meatus =31 Meatus =$25\frac{1}{2}$		17
30	50	No Gon. No masturbation.	Urinates 2 to 3 times at night.	no enlarged.	6	$3\frac{1}{2}$=	34	At Bulb to $2\frac{3}{4}$=35 From $2\frac{3}{4}$ to Meatus =34 Meatus =25		18
31	34	No Gon. No masturbation.	Urinates 1 to 2 times at night; 6 times daily.	Enlarged (double).	$5\frac{1}{4}$	$3\frac{1}{2}$=	34	At Bulb to $3\frac{1}{2}$=38 From $3\frac{1}{2}$ to Meatus =34 Meatus =25		19
32	16	No Gon. Masturbation from 10 years old.			5	$3\frac{5}{8}$=	35	At Bulb =$34\frac{1}{2}$ Stricture at $4\frac{1}{2}$ From 3 in. to 1 =30 Meatus =26		3 to 5
33	27	No Gon. Masturbation from 9 to 14.	Urinates twice at night. Some dribbling.	Lateral meas. 2 inches.	5	$3\frac{1}{4}$=	32	At Bulb to 3 =$33\frac{1}{2}$ From 3 to Meatus =33 Meatus =$20\frac{1}{2}$		20
34	40	No Gon. Masturbation from 8 to 21.	Urinates twice at night.	Lateral meas. 2 inches.	$5\frac{1}{2}$	$3\frac{1}{4}$=	32	At Bulb to $3\frac{1}{4}$=32 At $3\frac{1}{4}$ =28 From $3\frac{1}{4}$ to Meatus =32 Meatus =19		21

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No. of case.	Age of Patient.	Antecedent History.	Present Condition. Functions, etc.	Prostate Gland.	Length of Flaccid Penis from Meatus to B. M. Junction. In inches.	Circumference of Penis in inches.	Cal. estim'd from circum. of Penis. Mm.	Measurements with Urethrametre. Dis. from Meatus in inches.	Actual Cal. of Urethra. Mm.	
35	46	No Gon. No masturbation.	Urinates once at night. No dribbling.	Not examined.	5	$2\frac{7}{8}$=	29	At Bulb to $2\frac{3}{4}$ =32 At $2\frac{3}{4}$ =26 From $2\frac{3}{4}$ to Meatus =29 Meatus =29	22	
36	31	No Gon. Masturbation every day, 11 to 14	Frequent nocturnal emissions.	Not enlarged.	5	$3\frac{1}{8}$=	31	At Bulb to 3 =33 At $2\frac{1}{2}$ =30 From $2\frac{1}{2}$ to 1 =32 Meatus =20	23	
37	45	No Gon. No masturbation.	No dribbling.		5	$3\frac{1}{2}$=	34	At Bulb to $2\frac{3}{4}$ =$34\frac{1}{2}$ From $2\frac{3}{4}$ to Meatus =$34\frac{1}{2}$ Meatus =32	24	
38	33	No Gon. No masturbation.	Urinates once at night.		$5\frac{3}{4}$	$3\frac{1}{4}$=	32	At Bulb to $3\frac{1}{4}$ =37 From $3\frac{1}{4}$ to Meatus =$26\frac{3}{8}$ Meatus =16	1 to 3 5	
39	55	No Gon. No masturbation.	Urinates 3 times at night.		6	$3\frac{1}{4}$=	32	At Bulb to $3\frac{1}{2}$ =32+ From $3\frac{1}{2}$ to Meatus =32 Meatus =30	25	
40	52	No Gon.	Urinates at night; 4 times daily		6	$3\frac{3}{4}$=	36	At Bulb to $2\frac{3}{4}$ =38 From $2\frac{3}{4}$ to Meatus =$34\frac{3}{4}$ Meatus =24	1 to 3 26	
41	39	No Gon.			$5\frac{3}{4}$−	$3\frac{1}{2}$=	34	At Bulb to $2\frac{1}{2}$ =35+ From $2\frac{1}{2}$ to 1 =33 to Meatus =31 Meatus =22		
42	30	No Gon.			$4\frac{3}{4}$+	$3\frac{1}{2}$=	34	+At Bulb to $2\frac{3}{4}$ =37 For $\frac{1}{4}$ =36 to Meatus =34 Meatus =24+	27	

MEASUREMENTS OF THE NORMAL MALE URETHRA IN 100 CASES.

No. of case.	Age of Patient.	Antecedent History.	Present Condition. Functions, etc.	Prostate Gland.	Length of Flaccid Penis from Meatus to B. M. Junction. In inches.	Circumference of Penis in inches.	Cal. estim'd from circum. of Penis. Mm.	Measurements with Urethrametre. Dis. from Meatus in inches.	Actual Cal. of Urethra. Mm.	
43	21	No Gon.			$5\frac{1}{2}$	$3\frac{1}{2}$+	34	At Bulb to $3\frac{1}{2}$ =$37\frac{1}{2}$ From $3\frac{1}{2}$ to Meatus =33 Meatus =24	28	
44	41				$5\frac{1}{2}$−	$3\frac{3}{4}$−	36	At Bulb to 3 =38 From 3 to Meatus =$36\frac{1}{2}$ Meatus =26	20	Pat. stated had Gon. in boyhood.
45	38	No Gon.			$5\frac{1}{4}$	$3\frac{3}{8}$=	33	At Bulb to $3\frac{1}{2}$ =34 From $3\frac{1}{2}$ to Meatus =33 Meatus =21	30	
46	46	No Gon.			5	$3\frac{1}{4}$=	32	At Bulb to 3 =36 From 3 to Meatus =$34\frac{1}{2}$ Meatus =24	31	
47	46	No Gon.			$5\frac{1}{2}$	$3\frac{3}{4}$=	36	At Bulb to 3 =38 From 3 to Meatus =37 Meatus =$33\frac{1}{2}$	32	
48	29	No Gon.			$5\frac{1}{2}$	$3\frac{3}{4}$=	36	At Bulb to 3 =$36\frac{1}{2}$ From 3 to Meatus =35 Meatus =27	3 to 5 33	Urethra very sensitive.
49	34	No Gon.			$5\frac{1}{2}$	$3\frac{1}{4}$=	32	At Bulb to $3\frac{1}{2}$ =37 From $3\frac{1}{2}$ to 3 =34 At 3=30 Stricture. From 3 to 2=34 At 2=30 Stricture. Meatus =18	34	
50	42	No Gon.			$4\frac{3}{4}$	$3\frac{1}{4}$=	32	At Bulb to $3\frac{1}{4}$ =33 From $3\frac{1}{4}$ to Meatus =32 Meatus =27	J. R. W. 35 3 to 5	

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MEASUREMENTS OF THE NORMAL MALE URETHRA IN 100 CASES.

No. of case.	Age of Patient.	Antecedent History.	Present Condition, Functions, etc.	Prostate Gland.	Length of Flaccid Penis from Meatus to B. M. Junction. In inches.	Circumference of Penis in inches.	Cal. estim'd from circum. of Penis. Mm.	Measurements with Urethrametre. Dis. from Meatus in inches.	Actual Cal. of Urethra. Mm.	
51	47	No Gon.			5 7/8 —	3 1/2	34	At Bulb to 3 =36 From 3 to Meatus =35 1/8 Meatus =27		36
52	23	No Gon.			5 1/2	3 3/4 =	36	At Bulb to 3 =38 1/2 From 3 to Meatus =36 Meatus =27 1/2		37
53	40	No Gon.			5 1/2	3 1/2 +	34	+At Bulb to 3 =36 From 3 to Meatus =35 Meatus =31		38 3 to 5
54	30	No Gon.			5 1/2	3 1/2 =	34	At Bulb to 3 =37 From 3 to Meatus =31 Meatus =27		3 to 5
55	36	No Gon.			5 1/4	3 1/8 =	31	At Bulb to 3 =33 From 3 to Meatus =31 Meatus =18		39
56	32	No Gon. No masturbation.	Urinates twice at night. Urethra very sensitive.		5 1/2	3 3/8 =	33	At Bulb to 3 1/4 =34 From 3 1/4 to Meatus =34 Meatus =26		50 to 70 in presence of Dr. W. T. Bull. 40
57	30	No Gon.	Urinates every 2 hrs. and once or twice at night		5 1/4	3 1/4 =	32	At Bulb to 2 3/4 =34 From 2 3/4 to Meatus =32 Meatus =32		41
58	69	No Gon.		Lateral measurement 1 1/2 inches.	4 3/4	3 1/2 =	34	At Bulb to 3 1/4 =34 From 3 1/4 to Meatus =33 Meatus =32		42 1 to 3
59	40	No Gon.	Frequent seminal emissions.		5 1/2	3 1/4 =	32	At Bulb =36 From bulb to Meatus =36 Meatus =30+		37 arrested at the usual place. 43

MEASUREMENTS OF THE NORMAL MALE URETHRA IN 100 CASES.

No. of case.	Age of Patient.	Antecedent History.	Present Condition, Functions, etc.	Prostate Gland.	Length of Flaccid Penis from Meatus to B. M. Junction. In inches.	Circumference of Penis in inches.	Cal. estim'd from circum. of Penis. Mm.	Measurements with Urethrametre. Dis. from Meatus in inches.	Actual Cal. of Urethra. Mm.	
60	41	*	Urinates 2 to 3 times at night.		5 1/4	3 3/8 =	33	At Bulb to 3 1/2 =34 From 3 1/2 to Meatus =33 Meatus =20		Extirp'd (Consid. in boyhood. 44
61	38	No Gon. Masturbation daily from 15 yrs. old for 6 years.	Urinates 2 to 3 times at night.		5 1/4	3 3/8 =	33	At Bulb to 2 1/2 =33 At 2 1/2 =30 From 2 1/2 to Meatus =33 Meatus =25		45
62	41	No Gon. Masturbation from 18 to present time.	Urethra very sensitive.		4 1/2	3 =	30	At Bulb to 3 =33 At 3 =28 From 3 to Meatus =30 Meatus =28		46 1 to 3
63	65	No Gon.			4 3/4	3 3/4 =	36	At Bulb to 3 1/4 =38 1/2 At 3 1/4 =34 From 3 1/4 to Meatus =35 Meatus =25		Pus on instrument when withdrawn. 47
64	46	No Gon.	Occasional dribbling after urinating. No frequency of urin'tion		5 1/2	4 1/4 =	40	At Bulb to 3 =42 1/2 From 3 to Meatus =39 Meatus =25		48
65	28	No Gon. No masturbation.			5	3 1/4 =	32	At Bulb to 3 =35 1/2 From 3 to Meatus =34 — Meatus =20		49
66	47	No Gon.			5 1/4 —	3 1/4 =	32	At Bulb to 3 =37 From 3in. to Meatus =34 Meatus =28		50
67	17	No Gon. Masturbation from 10 yrs. old to present time (says twice a w'k)			5	3 3/8 =	33	At Bulb to 3 in. =35 From 3 to 2 1/2 =29 1/2 From 2 1/2 =31 Meatus =29+		1 to 3

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MEASUREMENTS OF THE NORMAL MALE URETHRA IN 100 CASES.

No. of case.	Age of Patient.	Antecedent History.	Present Condition. Functions, etc.	Prostate Gland.	Length of Flaccid Penis from Meatus to B. M. Junction. In inches.	Circumference of Penis in inches.	Cal. estim'd from circum. of Penis. Mm.	Measurements with Urethrametre. Dis. from Meatus in inches.	Actual Cal. of Urethra. Mm.	
68	53	No Gon.	Urinates 2 to 3 times at night.		$4\frac{1}{2}$	$3\frac{1}{4}$=	32	At Bulb to 3 =$33\frac{1}{2}$ From 3 to $2\frac{1}{2}$=32 At $2\frac{1}{2}$=disti'ct band Meatus =25	51	
69	49	No Gon.			$5\frac{1}{2}$	$3\frac{3}{4}$=	36	At Bulb to $1\frac{1}{2}$=40 At $1\frac{1}{2}$ =$35\frac{1}{2}$ to Meatus =38 Meatus =29	52	
70	36	No Gon. Masturbation every day for 5 or 6 years.			5	3 =	30	At Bulb to 3 =34 From 3 to Meatus } =29 Meatus =25	53	
71	48	No Gon.			4	3 = $2\frac{3}{4}$ Dr Smith	30	At Bulb to $2\frac{1}{2}$=32= Point of arrest. From $2\frac{1}{2}$ to Meatus } =31 Meatus =31	3 to 5	Cases 71 to 81 inclusive, were examined with Dr. Peters and Dr. Smith at Bellevue Hosp. 54
72	41	No Gon.	Urinates once at night.		5	$3\frac{1}{4}$= $2\frac{3}{4}$ Dr Smith	32	At Bulb to $2\frac{1}{2}$=36= Point of arrest. From $2\frac{1}{2}$ to Meatus } =34 Meatus =34	55	
73	20	No Gon.			$4\frac{3}{4}$	$3\frac{1}{2}$= $2\frac{3}{4}$ Dr Smith	34	At Bulb to $2\frac{1}{2}$=$35\frac{1}{2}$ =Point of arrest. From $2\frac{1}{2}$ to Meatus } =34 Meatus =29	3 to 5	
74	48	No Gon.	Penis firm.		4	3 = $2\frac{1}{2}$ Dr Smith	30	At Bulb to $2\frac{1}{2}$=36= Point of arrest. From $2\frac{1}{2}$ to Meatus } =33 Meatus =24	56	
75	19	No Gon.	Penis firm.		$5\frac{1}{2}$	$3\frac{1}{2}$= 3+ Dr Smith	34	At Bulb to 3 =36= Point of arrest. From 3 to Meatus } =34+ Meatus =$28\frac{1}{2}$	57	

MEASUREMENTS OF THE NORMAL MALE URETHRA IN 100 CASES.

No. of case.	Age of Patient.	Antecedent History.	Present Condition. Functions, etc.	Prostate Gland.	Length of Flaccid Penis from Meatus to B. M. Junction. In inches.	Circumference of Penis in inches.	Cal. estim'd from circum. of Penis. Mm.	Measurements with Urethrametre. Dis. from Meatus in inches.	Actual Cal. of Urethra. Mm.	
76	30	No Gon. (Denied).			$5\frac{1}{8}$	$3\frac{7}{8}$= (2⅞ Dr. Smith)	32	At Bulb to $3\frac{1}{2}$=35+ =Point of arrest. From $3\frac{1}{8}$ to 1 inch. } =33 At 1 inch=24 band From 1 to Meatus } =30 Meatus =25+		
77	24	No Gon.			$5\frac{1}{8}$	$3\frac{1}{4}$= $2\frac{3}{8}$ Dr Smith	32	At Bulb to $3\frac{1}{2}$=$36\frac{1}{2}$ =Point of arrest. From $3\frac{1}{2}$ to Meatus } =34 Meatus =34	58	
78	40	No Gon.			$4\frac{1}{4}$	$3\frac{1}{4}$= $2\frac{3}{8}$ Dr Smith	32	At Bulb to $3\frac{1}{4}$=35= Point of arrest. At $3\frac{1}{4}$ =31 From $3\frac{1}{4}$ to Meatus } =32 Meatus =32	59	
79	40	No Gon. See No. 92. Examined 2 days after	Erection occurred on introducti'n of Urethrametre. Penis flaccid.	Erect.=	7 flaccid Erect. arrest	=3⅝ =4¾ slig ht	35	At Bulb to 2 inches from bulb } =37 from bulb to Meatus } =36 Meatus =$27\frac{1}{2}$	60	Measurements made during state of erection.
80	30	No Gon. Masturbation.	Has had spasmodic stoppage of flow of uri'e stop for a sec. or two. Dribbles after urination.		5	$3\frac{1}{8}$=	32	At Bulb to 3 =35= Point of arrest. At 3 =30 From 3 to Meatus } =32 Meatus =$25\frac{1}{2}$	61	Pus on instrument.
81	39	No Gon. Masturbation for 3 or 4 years.			$5\frac{1}{2}$	$3\frac{3}{4}$=	36	At Bulb to $3\frac{3}{4}$=42= Point of arrest. From $3\frac{3}{4}$ to Meatus } =$35\frac{1}{2}$ Meatus =31	62	
82	35	No Gon.			$5\frac{1}{2}$	4†=	38	+At Bulb to $3\frac{1}{2}$ } =39 From $3\frac{1}{2}$ to 2 =38 At 2 =36 At 1 =33 Meatus =22	3 to 5	Pat. after exa n a'd of urethritis lasting 6 weeks

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No. of case.	Age of Patient.	Antecedent History.	Present Condition, Functions, etc.	Prostate Gland.	Length of Flaccid Penis from Meatus to B. M. Junction. In inches.	Circumference of Penis in inches.	Cal. estim'd from circum. of Penis. Mm.	Measurements with Urethrametre. Dis. from Meatus in inches.	Measurements with Urethrametre. Actual Cal. of Urethra. Mm.	
83	27	No Gon. Masturbation from 10 years old to 24.	No dribbling.		$5\frac{1}{2}$	$3\frac{1}{8}=$	34	At Bulb to 3 in.	=35	Urethra very sensitive. 63
								From 3 in. to Meatus	=34	
								Meatus	=25+	
84	41	No Gon. No masturbation.			$5\frac{1}{2}$	$3\frac{1}{4}=$	32	At Bulb to 3 in.	=33	64
								From 3 to Meatus	=31+	
								Meatus	=23	
85	30	No Gon.			5	3 =	30	At Bulb to 3	=32	65
								From 3 to Meatus	=31	
								Meatus	=19	
86	19	No Gon. Masturbation for 4 years.			5—	3=—	30	At Bulb to $3\frac{1}{2}$	=32	66
								From $3\frac{1}{2}$ to Meatus	$=29\frac{1}{2}$	
								Meatus	$=19\frac{1}{2}$	
87	23	No Gon. No masturbation.			$4\frac{1}{2}$	3 =	30	At Bulb to $2\frac{1}{2}$	=36	67
								From $2\frac{1}{2}$ to Meatus	=32+	
								Meatus	$=22\frac{1}{2}$	
88	43	No Gon.			$5\frac{1}{2}$	$3\frac{1}{2}=$	34	+At Bulb to 3	=33	68
								From 3 to Meatus	=32	
								Meatus	=25	
89	45	No Gon.			5	$3\frac{1}{4}=$	32	At Bulb to 3	=34	69
								From 3 to Meatus	=32	
								Meatus	$=24\frac{1}{2}$	
90	80	No Gon.			$4\frac{1}{2}$	$3\frac{3}{8}=$	33	At Bulb	=35	70
								No arrest. From bulb to Meatus	=35	
								Meatus	=25	
91	38	No Gon.			5	$3\frac{1}{4}=$	32	At Bulb to $2\frac{1}{2}$	=33	Folds are very slight. 71
								From $2\frac{1}{2}$ to Meatus	=32	
								Meatus	=17	

MEASUREMENTS OF THE NORMAL MALE URETHRA IN 100 CASES.

No. of case.	Age of Patient.	Antecedent History.	Present Condition. Functions, etc.	Prostate Gland.	Length of Flaccid Penis from Meatus to B. M. Junction. In inches.	Circumference of Penis in inches.	Cal. estim'd from circum. of Penis. Mm.	Measurements with Urethrametre. Dis. from Meatus in inches.	Measurements with Urethrametre. Actual Cal. of Urethra. Mm.	
92		Case No. 79 in flaccid state.			$5\frac{1}{8}$	$3\frac{5}{8}=$	35	At 3 in. 36 is arrested on 2 or 3 slight ridges.		72
								Meatus	$=27\frac{1}{2}$	
93	62	No Gon.			5	$2\frac{7}{8}=$	29	At Bulb to 3	=34	Pat. admitted 2 Len'th (ext'nal) attacks of urethritis. 73
								From 3 to 2	=23	
								From 2 to Meatus	=27	
								Meatus	=17	
94	55	No Gon.	Urinates 5 to 6 times at night.		$3\frac{1}{2}$	$2\frac{3}{4}=$	28	At Bulb to 2	=30	
								From 2 to Meatus	=29	
								Meatus	=19	
95	24	No Gon.	Frequent seminal emissions.		5	$3\frac{1}{8}=$	31	At Bulb to 3	=33	
								For $\frac{1}{2}$ inch	=29	74
								To Meatus	=32	
								Meatus	$=23\frac{1}{2}$	75
96	27	Gon. 5 yrs. ago.			5	$3\frac{1}{8}=$	31	At Bulb to $3\frac{1}{2}$	=33	
								From $3\frac{1}{2}$ to Meatus	=32	
								Meatus	$=22\frac{1}{2}$	
			Relative proportion corresponds within two Milimetres in 76 cases.							Cases 90 to 99 inclusive examined with Dr. Pilfard. 76
97	53	No Gon.			5	$3\frac{3}{8}=$	31	At Bulb	=32	
								From bulb to Meatus	=32	
								Meatus	=26	
98	53	Gon. 3 yrs. ago.			5	$3\frac{1}{4}=$	32	At Bulb to 3 inches	=35	
								At 3 inches	=30	
								For $\frac{1}{2}$ inch	=30	
								At $2\frac{1}{2}$	=34	
								From $2\frac{1}{2}$ to Meatus	=32	
								Meatus	=32	
			Measurements in this case confirmed on the dead subject by Prof. Stephen Smith and Prof. A. Jacobi.							

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99	32	No Gon.				3½ =	34	At Bulb to Meatus = 35 Meatus = 33		1 to 3
100	38	No Gon.			5	3½ =	34	At Bulb to 3½ in. = 37 From 3½ to 1 = 34 At 1 = 30 Meatus = 34		Pus on instrument when withdrawn.

Patient then admitted "kick" on penis 3 or 4 years previous.

In making these examinations it was found that in almost every instance, there were 2, 3 and 4 distinct ridges at or near the peno-scrotal angle, *i. e.*, from one to two inches anterior to the junction of the bulbous with the membranous urethra. These were at a point where the mucous membrane would naturally fall into transverse folds, in the pendent position of the penis. The occurrence of an erection during examination, in one instance, confirmed this idea, inasmuch as the absence of the ridges was demonstrated with the urethra-metre at 36. But the subsequent examination of the same organ in flaccid condition with the urethra-metre again at 36, three bands were distinctly recognized. These folds then, would form inviting recesses for the lodgment of the solid constituents of the urine during an acid or an alkaline dyscrasia. Prolonged or repeated irritations from such cause, would naturally produce thickenings in these folds, soon interfering with their resiliency, so that they could no longer be obliterated on the natural distensions of the canal; more or less obstruction to urination necessarily results; in other words, a point of irritation has been established, a urethral contraction commenced, which, although not perhaps sufficient to attract attention, *per se*, yet on the establishment of a gonorrhœa, would be quite sufficient to increase the virulence of the disease, and finally to keep up the urethral discharge indefinitely. In confirmation of this view of the formation of non-specific Stricture at the peno-scrotal angle, I exhibited to the Society, upon the occasion of the reading of my reply to Dr. Sands's paper, a lad of nineteen years, who gave positive assurance of never having had gonorrhœa. He was first conscious of urinary difficulty at the age of seven; but beyond frequency of micturition, did not remember any trouble until about three years since, when he began to suffer more or less pain during and after micturition, and which was referred solely to the body of the penis. He presented at my college clinic about a month previous. Examination resulted in the discovery of a vesical calculus measuring 1¼ inches in its long, and ¾ of an inch in its short diameter. The lithotrite (No. 22 F.), in passing through the urethra was slightly held at about three inches, and then slid easily into the bladder; the stone was readily seized and crushed. On withdrawing the instrument, a small quantity of the debris held between its jaws, resulted in a little greater distension of the urethra than in its entrance, and arriving at the point before mentioned, and which had been the seat of the pain on urination, it was sharply and firmly arrested, and quite a little force was required for the extraction of the instrument. This Stricture (which I demonstrated with the bulbous sound No. 26) must be admitted, as confirmatory of the occurrence of Stricture without precedent gonorrhœa, and from the fact that he had stone in the bladder, the antecedent lithiasis, in connection with the folds of urethral mucous membrane just alluded to, affords an apparently satisfactory explanation of the method by which the Stricture was formed in this case, which may be accepted as typical of a large class.

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CHAPTER IX.

RETROSPECT.

SOON after the foregoing discussion in New York, viz. on March 16th, 1876, Mr. Berkeley Hill, Professor of Clinical Surgery in University College of London (as well as a representative writer on Diseases of the Genito-urinary organs), devoted a lecture to the consideration of my views and operations as they had come to be understood after the lapse of nearly a year from my personal enunciation and demonstration of them in that college. This lecture was subsequently published in the London *Lancet*, in the issue of April 8th, 1876.

In order to show the status of urethral science in Great Britain at the time of my visit (pages 215, et seq.) and to illustrate misunderstandings of my views which may have obtained elsewhere I reproduce this Lecture in full, as well as my "Explanatory Remarks," in reply, which, with a good sense of "English fair play," were promptly published by the editor of the *Lancet*, in the issues of June 3d and June 10th, 1876.

A Clinical Lecture on the Treatment of Incipient Stricture, by Otis's operation, delivered at University College Hospital, London, Eng., March 16th, 1876, by Berkeley Hill, Professor of Clinical Surgery in University College.

Gentlemen:—In a lecture which I had the honor of delivering before you more than a year ago,* I endeavored to describe and classify the various causes of the scanty urethral discharge known by the term "gleet." I pointed out that,

* Reported in The London *Lancet*, of Feb. 13, 1875.

produced by affections of very different nature and in different parts of the urethra, these discharges required very distinct kinds of treatment for their cure. I still adhere to that opinion—one common to most who study urinary disorders.

Last July, you recollect, Dr. Fessenden N. Otis, a distinguished surgeon of New York, demonstrated in our operating theatre his mode of curing gleets and Stricture of the urethra, in a lecture remarkable for its clearness and for the skill with which his manipulations were performed. In that exposition Dr. Otis enunciated views which vary considerably from, and indeed are opposite to, the doctrines usually taught in this country. I propose to-day to examine what we were told on that occasion with the light that some experience we have been able to gain in our own hospital has thrown upon it. In doing this I would not have you suppose that there was little to be learned from our American *confrere;* on the contrary, I am satisfied that much of what he told us is perfectly true, and a real contribution to our knowledge of urethral affections.

The chief points of Dr. Otis's demonstrations were:

1. The human urethra varies much in its calibre in different persons. Hence an instrument that is a full size for one man may be either much too great or too small for another.

2. The urethra is really much wider than is generally taught.

3. The meatus urinarius is normally as wide as the rest of the canal.

4. The gleet is always due to Stricture. It is "the signal that nature hangs out to call attention to the fact that Stricture exists somewhere."

5. In the term Stricture Dr. Otis includes those early indurations which have not sufficiently advanced to interfere with the passage of urine or to produce any symptom beyond a discharge. But he maintains them to be really bands of contractile tissue fibre produced by inflammatory action.

6. Stricture is most frequent in the first inch from the

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meatus, and is less frequent as the distance from the entry increases.

7. Complete division of a Stricture and maintenance of the incised part at its natural width until the incision is thoroughly healed prevents return of the contraction, and, moreover, *causes absorption of the indurated tissue from the affected part.*

I propose to examine the novelties, one by one.

That the urethra should vary in calibre in different persons, considering that the penis also varies greatly, might well be presumed *à priori;* and Dr. Otis has most satisfactorily demonstrated that it does so. But I trust you have not forgotten the description of the urethra given by Sir Henry Thompson in his lectures to you before Christmas. He there showed how the urethra is not a tube at all except while some body is passing along it, and defined it to be a *closed valvular chink*, capable of distension to a different amount in different parts of its length. It will be well to bear this in mind, and also that for our purpose to-day we are concerned only with the *spongy portion* of the urethra.

Books on anatomy tell us that the bulbous portion is somewhat wider than the rest, having a circumference of seven-tenths of an inch, and that the remaining part is one or two-tenths less in circumference; further, that the meatus does not exceed one-quarter of an inch in width. These measurements are doubtless taken from the dead body, and if we conclude that they represent the dimensions of the living urethra, we shall be in error. The practical importance of ascertaining what is the usual extent to which the "valvular chink" is dilated during micturition is this; diminution of capacity in the urethra means impediment to the flow of the urine from the bladder. If the balance between the natural expulsive force of the bladder and the friction of the stream along the urethra is disturbed, the bladder is irritated, the kidneys are affected, and the beginning of the long chain of events, which terminate not infrequently in death, is made. To know if a man has Stricture, we must first know what the

natural distensile power of his urethra is, and to ascertain this, Dr. Otis discards any arbitrary standard, which, you know, is set at about No. 12 of the English scale, but measures each urethra before he proceeds to operate upon it. For this purpose he has invented a most ingenious instrument which he calls the "urethra-metre." It consists of a slender cannula marked in inches, at the end of which a set of steel springs can be expanded into a bulb by advancing a stem within the cannula. This movement is obtained by turning a screw at the handle, and the amount of expansion is recorded by an index on a dial-plate. When screwed close the instrument is not larger than a No. 6 English sound—that is a circumference of less than half an inch. It can be expanded to a maximum circumference of an inch and three-quarters—two and a half times the seven-tenths of an inch which your anatomical guides tell you is the circumference of the widest part of the spongy portion. To measure the urethra the expanding sound, covered by a thin india-rubber sheath (C., Fig. 1), is introduced in its contracted form as far as the bulb, between five and six inches. It is then screwed up until the patient announces he has a sense of fulness, but not so tightly that the instrument cannot be moved without being grasped by the passage. This gives the size of the canal at the bulbous part. The urethra-metre is gently withdrawn, the expanding part being enlarged or diminished as tight places or slack ones are passed, and the several dimensions are noted by observing the index, and the distance of the expanding part from the meatus. Any diminution from the widest measurement Dr. Otis holds to be a Stricture, and abnormal. For the further examination of these contracted areas, Dr. Otis employs a series of bulbous sounds ranging from about No. 4 English catheter to one much greater than any size in our scale. But before describing them I must remind you that Dr. Otis, like nearly all who work at urethral affections, has discarded the English scale, one entirely arbitrary, ascending from the smaller to the higher numbers by wide grades of unequal length. He chooses the French scale, which is per-

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fectly scientific. It takes the millimetre for its unit, and the number of the instrument denotes its circumference in millimetres. Thus No. 1 French is one millimetre in circumference; No 20, twenty millimetres; and so on. Compared with these, No. 1 English is equal to No. 3 French, and No. 11 English to No. 20 French.

Here is a gauge Mayer and Meltzer have made for me, with forty sizes cut in the plate. The plate is marked on one side with the French numerals, and also graduated with a decimetre divided into centimetres and millimetres. On the other side the English numerals are marked opposite their respective sizes, and there is also a scale of six inches, divided into sixteenths of an inch. Thus the catheter-gauge forms a ready means of comparing French with English measures.

Dr. Otis's series of bulbous sounds are spread out before you. They have a slender stem of about four millimetres screwed into the wider end of a bulb or bullet. The best shape for the bulb is that of a turkey's egg, which you know is a little more pointed at the small end than the egg of a common hen. The bulbs range in size from No. 8 to No. 40. Their number corresponds to the big end.

With these instruments Dr. Otis has measured over 500 urethræ, from which he tells us that the expanding capacity of the urethra bears a constant ratio to the circumference of the penis below the glans. Hence if you measure the outside of the penis you can foretell the size of the urethra. Further, that the average size is between thirty-one and thirty-two millimetres, or an inch and a quarter—that is more than half as large again as the measurement hitherto accepted. From these observations also, Dr. Otis finds that the meatus, when not congenitally narrowed or contracted by balanitis in boyhood, a frequent occurrence, is as wide as the rest of the urethra. I have not measured a number of urethræ approaching to 500, but I will give you the results of my measurements so far as they go. Since last spring I have measured ninety-five urethræ (all of them in subjects of urinary disease, by the

way), and in only three did I find the meatus as wide as the rest of the canal. One of the three exceptions was that of a man who never had gonorrhœa, but an exceedingly narrow traumatic Stricture of the bulbo-membranous part. In him No. 32 sound slid easily down to the Stricture by its own weight. This would show that the meatus may be either normally narrower than the rest of the canal, or that morbid contraction is exceedingly common. Be that as it may, practically we have generally to deal with a narrow meatus, the average size being twenty-two millimetres. The measurement of these ninety-five urethræ, has satisfied me that we have under-estimated the size of the urethra, and that Dr. Otis is correct in claiming larger calibres for that canal. But I have not found the bore, so to speak—the capacity for distension, in more accurate diction—to be uniform from the bulb to the meatus. At the bulbous part the urethra is widest, and remains of even width for about two inches. It then narrows gradually, and for the rest of the passage is about three millimetres less, being most narrow at the outlet. This is, as you well know, in agreement with the description of anatomists, only that the distensile capacity of the urethra measured in the living body was greater than the limits they set down. Thus the spongy urethra is conical in shape, resembling the tapering nozzle of a syringe. Whether this be a provision of nature to make the escaping stream more forcible I know not, but you will recollect that the special *raison d être* of this part of the urethra is to conduct, not the urine, but the semen. Of this I am persuaded, that the less calibre of the urethra at this point is natural, and not the result of inflammation, so long as it is gradual and not abrupt. Morbid narrowings are easily perceived by the sudden way in which they obstruct the bullet, and by the suddenness with which it is released when they are passed.

Next, with regard to the invariable presence of a non-dilatable area of the urethra, a band of contracting fibres, that is, a Stricture of more or less development, in every case of gleet. I repeat that I still think that Stricture in any

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shape is not the sole cause of gleet, though doubtless this is the most frequent condition in such cases.

With respect to Stricture being most frequent in the first inch and a quarter of the urethra, out of 258 Strictures, Dr. Otis found 115 within that distance of the meatus, and the remainder in decreasing frequency in each succeeding inch. This you know is contrary to the received doctrine, which places Stricture most frequently at the bulbo-membranous part. My experience does not support Dr. Otis's statement. In 1870 I recorded 63 Strictures, examined with bulbous sounds, at the Male Lock Hospital in 1869, when I found them 43 times between four and a half and six inches—a position, allowing for variation in inches length of the passages in different persons, almost the same in all.

Next, having ascertained the presence of some unnatural narrowing of the spongy urethra, does internal division cure it, and prevent its return or further development, and consequently cure the gleet? If we adopt Dr. Otis's teaching, our course is simple. A patient applies for cure of a gleet. His gleet must be the consequence of Stricture; cut completely through it to the erectile tissue, so as to make the urethra a little wider than before, and take care to maintain this artificial patency while the incision is healing: the cure is then complete and permanent. This is the result of operating in a large number of cases, a report of which has been published in several forms. In 100 published cases, 31 patients were found without recontraction when examined at a considerable period after operation; 52 others were not examined, but reported themselves well; the remaining 17 were not quite cured, though relieved. Such evidence induced me to give a trial to this method. I may state that all the cases operated on here were those of long standing gleets with contraction in one or more parts of the spongy urethra, and had undergone multifarious treatment. The number of patients is sixteen; fifteen of my own and one of Dr. Otis's—the case in which he operated in our theatre on the 6th of July last. In five cases the gleet stopped after the

operation, and the patient was at the last report—taken in none less than three weeks, in most some months, after the operation—able to pass a bougie of the estimated size of the urethra. In short, they may be claimed as cures. But of these five the operation was serious to two; one had free bleeding for three days, the other three attacks of rigors. Of the remaining eleven, among whom Dr. Otis's own operation must be included, the gleet persisted in all; in several the urethra shrank again to its size before the operation, and in some very serious complications ensued. In four bleeding lasted several days, and in one was even alarming. Three patients had rigors; in two the shivering was unimportant, being that which follows the first transit of urine along the incised urethra in certain individuals, but is not repeated or attended by further consequences. In the third patient the rigors preceded abscess in the buttock. One patient had orchitis. Thus in seven the operation might be termed a trifle, causing no pain nor any after-fever; but in five only was the operation successful. It may be contended that want of practice on my part, or imperfect performance of the operation, were the causes of this small success. But I am protected against this danger by having had the benefit of Dr. Otis's personal instructions, and by the fact that one of the least successful cases was that in which Dr. Otis operated himself. The man was in sound health with the exception of his gleet and contraction of the urethra at two and a half inches from the orifice. He made light of the operation, submitting most patiently to the somewhat prolonged manipulations; being animated by the patriotic resolve, as he afterwards told us, that "No Yankee should make *him* flinch." The patient bled copiously after the operation; the hæmorrhage not stopping altogether for six days. No other complication ensued, the man was able to get up as soon as the bleeding had stopped, and would have left the hospital at once if permitted. However, though he remained some weeks longer with us, and afterwards attended assiduously for the regular passage of the sound, his gleet persisted till

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Christmas, and was at last cured by other means. There still remains a scar or induration in the erectile tissue, which gives a crook to the organ during erection. Whether the division of the contracting band caused permanent absorption thereof in any of these patients I do not know, but have very little expectation that it did so. Certainly it failed of this effect in almost all.

When telling you, as those who frequent my wards already know, that I have abandoned this operation for curing gleets accompanying slight contraction of the urethra, I should not omit to tell you that in one point I have varied from Dr. Otis's operation. His urethrotome, which I hold in my hand, is used as follows:—The instrument is passed along the urethra until the end is well beyond the Stricture. The instrument is then dilated until it stretches the urethra to its full capacity, or, to make sure, to one or two millimetres beyond that capacity. Next a small cutting edge, previously concealed, at the end of the dilating part, is drawn along the tightly-stretched tissue to the meatus. This long furrow is made in the mesial line in the roof of the urethra. Disliking this long cut, which divides uncontracted parts, as well as the strictured parts, I have employed, except in one case, a Stricture incisor, which, while it stretches the urethra to the size previously determined, cuts only where it is strictured. Its mode of action I shall explain when speaking of the division of narrow Strictures. As the contracted areas are as freely divided by this plan of cutting, I cannot fairly charge it with the numerous failures that have attended Otis's plan of treating wide Strictures.

The plan of treating these affections to which I have returned is that which I adopted before—namely, the repeated passage of bougies, large enough to distend the Stricture, but not large enough to be tightly grasped. The size of the bougie is increased at each visit—that is, about twice a week—to keep pace with the increasing expansion of the urethra until the capacity of the uncontracted parts is reached, when the same size is continued by the patient himself for several weeks

longer. When the meatus is greatly smaller than the rest of the passage, I cut it either by Otis's meatome, this straight probe-pointed bistoury, or by a bistouri câché, to which Coxeter has added a second shield, which can be separated from the first by a screw-pin, and so make the fibres tight before they are divided. The incision is made in the floor, and must be pretty complete, as the little ring of fibres is very tough, and often needs two or three applications of the knife to divide it fairly.

But do not misunderstand me. I do not mean that every gleet requires instrumentation forthwith as a matter of course; on the contrary avoid the use of instruments whenever you have satisfactory evidence that the discharge is not of long standing. The exact length of time that indicates Stricture is uncertain, for the inflammatory induration constituting Stricture is formed very slowly in some persons, but comparatively fast in others. As a general rule don't search the canal when the discharge has lasted only six months or less. Be sure, however, that the whole duration of the discharge is really contained in six months, and that there have not been previously periods of clap or gleet to which the present discharge is only a successor. Several relapses of gleet are very strong evidence of Stricture. Bear constantly in mind that the introduction of an instrument of any kind into the urethra is an evil, and though in time the canal gets accustomed to the foreign body, this, like many other faculties, is not acquired without discomfort or pain. Resort to instrumentation only when you are satisfied there is legitimate cause for it. Nevertheless when you do employ instruments to search for Stricture, use such as are adapted to the end in view; and at our next meeting I will explain to you why I prefer bulbous sounds and bougies to those of equal thickness throughout.

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CHAPTER X.

DISCUSSION CONTINUED.

*Explanatory Remarks by Dr. Otis, in Reply to Mr. Hill.**

AMONG the many valued professional courtesies extended to me during a brief stay in Great Britain last summer, none was more esteemed than that which proffered me the opportunity of fairly presenting to the medical profession in England my somewhat peculiar views in relation to some points in urethral surgery. Through the invitation of Mr. Berkeley Hill, Professor in the University College of London, and by the aid of the clinical material kindly placed at my disposal by him, I was enabled to do this, in a lecture at the University College, under circumstances every way favorable and agreeable to me.

The recent vigorous yet friendly analysis of this lecture by Mr. Hill, together with a summary of fifteen cases of urethral Stricture, operated on by him according to my method, and reported in *The Lancet* of April 8th, is just received. I desire the privilege of correcting, through the same influential medium, some important misapprehensions of my views and methods of procedure, and also to answer some objections made on points of special interest to all concerned in the progress of urethral surgery.

Mr. Hill has formulated my innovations upon the usually accepted views, as follows:

"1. The human urethra varies much in its calibre in different persons.

"2. The urethra is much wider than is usually taught.

"3. The meatus urinarius is normally as wide as the rest of the canal.

* Originally published in the London Lancet of June 3d, and 10th, 1876.

"4. Gleet is always due to Stricture.

"5. In the term Stricture Dr. Otis includes those early indurations which have not sufficiently advanced to interfere with the passage of urine, or to produce any symptom beyond a discharge. But he maintains them to be really bands of contractile tissue fibres, produced by inflammatory action.

"6. Stricture is most frequent in the first inch from the meatus, and is less frequent as the distance from the entry increases.

"7. Complete division of Stricture and maintenance of the incised part at its natural width until the incision is thoroughly healed and prevents return of the contraction, and, moreover, *causes absorption of the indurated tissue from the affected part*."

In the first place, let me pay a merited tribute to the ability, fairness, and kindliness with which Mr. Hill has considered questions involving so radical a departure from the time-honored teachings of authorities.

In regard to the first proposition, Mr. Hill frankly admits that "the urethra varies in calibre in different individuals. Considering," he fitly remarks, "that the penis also varies, this might be well presumed *à priori*." He thus rejects the assumption of a fixed standard, which he states is usually set at 12 of the English scale.

This conclusion is arrived at after the careful measurement of ninety-five urethræ, and fully confirms my claim that no intelligent diagnosis of the number, calibre, or extent of Stricture, in any individual, can be made while the assumption of a fixed standard is admitted.

In this connection Sir Henry Thompson is quoted as saying that "the urethra is not a tube at all except when some body is passing along it," and defines it to be a "closed valvular chink."

I am unable to attach any importance to the objection that the urethra is not a *tube* because it is a closed tube when not distended. It might with more reason be objected that the *chink*, being an *aperture* or a *crevice*, when closed, ceases

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to exist, and hence, notwithstanding its valvular attachment, would fail to convey any correct idea of the urethra. Mr. Hill, however, in a very masterly paragraph, has presented the practical aspect of the urethra, independently of appellatives, by showing the necessity of ascertaining to what extent a given urethra should be capable of being normally distended. He says: "*If the balance between the natural expulsive force of the bladder and the friction along the urethra is disturbed, the bladder is irritated, the kidneys are affected, and the beginning of the long chain of events, which terminate not unfrequently in death, is made.*" (Page 216.)

How, then, is this most important *balance* usually disturbed? Not by that most patient of all asses, *the bladder*, habitually doing its work more quietly and with less consideration than any other organ of the body, but by *the urethra*—sensitive, easily and frequently irritated, inflamed from various causes, and finally strictured to a greater or less degree. This it is that "increases the friction and disturbs the balance." Hence it becomes a matter of first importance to ascertain, at as early a period as is possible, the normal calibre of every urethra in which symptoms of *undue friction* are present, in order to ascertain the *amount* of constriction which has occurred. Thus, the *least* appreciable encroachments become worthy of attention, and hence we have reason for including, under the term *Stricture*, "those early indurations which have not sufficiently advanced to interfere (markedly) with the passage of urine, or to produce any symptom beyond a discharge" (point 5th), and these are readily and with precision made out by means of the urethra-metre and the bulbous sounds which Mr. Hill has illustrated and described.

The assertion that "gleet is always due to Stricture" (point 4th) finds corroboration in the known facts, that *constriction* always *increases friction;* that increased friction causes irritation; and that continued irritation of mucous membrane, anywhere, often produces and always prolongs a mucous or muco-purulent discharge. This then is my defence for considering the slightest encroachments upon the normal

urethral calibre worthy of consideration and treatment. I have stated it as my opinion that "gleet is always due to Stricture," yet I do not mean to be understood as claiming that division of Stricture always cures gleet. Inflammation of the eye, as a rule, always results upon the presence of a foreign body in it, and yet it is quite conceivable that the diseased action, originally set up by the presence of the foreign body, may not be entirely removed by the removal of the first cause; yet no one will deny that it is wise surgery, in every case (when it is possible), to remove the foreign body. Gleet may continue after the removal of its cause; the inflammatory action long continued, may have spread to the continuous mucous membrane of the urethral lacunæ and sinuses, and persist in spite of the removal of Stricture (or of the use of other means) indefinitely: those are exceptional and sad cases, but do not seem to me to invalidate the claim that "*as a rule gleet depends upon Stricture*," or that Stricture when present, should be removed as the first and most rational mode of remedying the evil.

Point 3d is an anatomical one. "The meatus urinarius is normally as wide as the rest of the canal."

I would not be understood to mean by this that it is usually so, but that this is the highest normal type of meatus. In a paper published in the *New York Medical Journal*, April, 1874, on "Urethrotomy, External and Internal," I remarked of this correspondence that it "may be considered as the normal condition of these parts, and any variations from such uniformity may be considered aberrations from the normal condition. These (aberrations), however, are, as a rule, of no practical importance unless the tissue composing them has been previously invaded by inflammatory action." "As long as the meatus escapes inflammatory action it does not become a source of trouble on account of its diminutive proportions. Let inflammation be set up in this locality, as may occur from extension of an infantile or an adult balanitis, or from gonorrhœa, or from any other cause, and a plastic exudation results, which, becoming organized, disables

the urethral muscular structure at this point, and it is no longer able to act efficiently in expelling the last drops of urine; they are retained, a dribbling results, and it is the unvarying sign that such an accident has occurred. We may have a meatus from the size of a mere pin-hole to the full size of the urethra behind it, and yet find no difficulty in any case. In a recent public examination of a hundred patients in Charity and Bellevue Hospitals, claimed to be free from inflammatory antecedents, the meatus

In	1	was	13 mm. cir.	In	17	were	25 mm. cir.
	3	were	15 "		3	"	25½ "
	1	was	16 "		4	"	26 "
	2	were	17 "		5	"	27 "
	3	"	18 "		3	"	27½ "
	3	"	19 "		2	"	28 "
	1	was	19½ "		1	was	28½ "
	3	were	20 "		5	were	29 "
	2	"	20½ "		3	"	30 "
	2	"	21 "		3	"	31 "
	5	"	22 "		5	"	32 "
	3	"	22½ "		4	"	33 "
	1	was	23 "		2	"	33½ "
	1	"	23½ "		3	"	34 "
	7	were	24 "		1	was	37½ "
	1	was	24½ "				

Average size in one hundred cases, 24.72.

In no case was the urethra, in the one hundred cases, below a calibre of 26 millimetres—ranging from this to 39—the average being 32–95. In none was any trouble complained of. None, then, can be strictly claimed to be abnormal as long as the functions of the part are well performed, and hence, in the presence of such great variations, it might be difficult to fix upon the *highest normal type* of the meatus urinarius. We do find, however, that various and grave difficulties and diseases are occasionally associated with a genito-urinary apparatus where the meatus is not of the full size of the urethra behind it, and that such difficulties are often promptly relieved by a surgical procedure which permanently enlarges the meatus to that size. The fact that such difficulties do not occur when the meatus is of the full size of the

canal behind it, gives additional weight to the assumption that "the condition of these parts which ensures the most complete functional integrity and is least liable to become the source or seat of disease, and which is also least liable to induce, aggravate, or prolong disease in the contiguous parts, may be safely and appropriately accepted as representing the *highest normal type*. Of the hundred cases above reported, the meatus was found to correspond to the size of the urethra behind it in ten cases, while none exceeded that limit. In his ninety-five cases Mr. Hill found the above-named correspondence in only three cases; his examinations, however, were made in subjects who confessed to previous or present inflammatory urethral trouble. The correspondence in my own hundred cases was more than I had previously claimed, which was about one in twenty. One hundred cases are probably too few to decide this point, and further observations are needed to settle it with exactness.

In regard to the calibre of the spongy portion of the urethra (point 2) Mr. Hill frankly states that his measurements of ninety-five urethræ confirm the truth of the statement that "the urethra is wider than is usually taught." He has, however, misapprehended in inferring that I consider the antebulbous urethra of uniform size. My observations completely coincide with Mr. Hill's that at the bulbous part the urethra is the widest (*i. e.*, most distensible). From this I have found a gradual narrowing for from one to two inches, and then a calibre almost uniform to the meatus, except where this is several degrees less in size, when there would be an expansion of from a quarter of an inch to an inch behind it, at the point usually referred to as the fossa navicularis. Measured with the urethra-metre, this difference between the bulbous and spongy urethra was

In	35	cases	1 mm.	In	2	cases	6 mm.
	21	"	2 "		2	"	7 "
	18	"	3 "		1	"	11 "
	6	"	4 "		13	"	no difference.
	2	"	5 "				

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The average difference in the 100 cases was $2\frac{5}{100}$ millimeters, and the calibre of the ante-bulbous portion averaged 32–95 mm.

Point 6th.—"Stricture is most frequent in the first inch from the meatus, and is less frequent as the distance from the entry increases." Mr. Hill dissents from this proposition, and says: "In 258 Strictures, Dr. Otis found 115 in the first inch and a quarter, and the remainder in decreasing frequency in each succeeding inch. This, you know," says Mr. Hill, "is contrary to the received doctrine, which places Strictures most frequently at the bulbo-membranous part. My own view does not support Dr. Otis's statement. In 1870," he says, "I recorded 63 Strictures examined with bulbous sounds at the Male Lock Hospital in 1869, when I found them 43 times between four inches and a half and six inches." I would simply recall the fact, that, at the date of these examinations, the *urethra-metre* had not been devised, and consequently in all cases where the meatus was of less size than the deeper urethra no efficient examination was possible; and all Strictures of larger calibre than the external orifice of necessity escaped detection. Had Mr. Hill's explorations been conducted from behind forwards, as with the urethra-metre, I feel quite confident that a difference of opinion on this point would not have been recorded. In all cases of Stricture of gonorrhœal origin, we might infer, *à priori*, that the Stricture would occur most frequently where the inflammation had been most intense and prolonged—*i. e.*, at the anterior portion of the canal. Strictures from lithiasis, masturbation, excessive venery, traumatism, &c.,* would naturally be expected in the deeper portions of the canal. The fact that no thorough examination of the urethra, with reference to Stricture, can be made without the urethra-metre must, I think, make it necessary to throw out all recorded results as to the exact number, size, and locality of Strictures when the explorations have been conducted by means of instruments of uniform size, or even with the bulbous sound or bougie alone.

* Thompson on Causes of Organic Stricture. Eng. Ed. p. 115.

In regard to the seventh point— viz., that "complete division of Stricture and maintenance of the normal urethral calibre, until the incision is thoroughly healed, prevents return of the contraction, and, moreover, causes absorption of the indurated tissue from the affected part," I am able to add five additional cases to the thirty-one referred to by Mr. Hill, where, out of 100 cases reported, this number was demonstrated to be absolutely free from Stricture upon a thorough re-examination, at periods varying from a few months to three years and a half from the dates of operation. Mr. Hill's observation of sixteen cases has left him in doubt as to whether or not "permanent absorption" follows *complete division* of Stricture. Previously to citing the results of operation in these sixteen cases (fifteen operated on by himself and one by me), Mr. Hill alludes to my method of operating on Stricture for the cure of gleet. He says: "A patient applies for the cure of gleet. His gleet must be the consequence of Stricture. Find that Stricture; cut it completely through to the erectile tissue, so as to make the urethra a little wider than before, and take care to maintain this artificial patency while the incision is healing. *The cure is then permanent and complete.*" Now if Mr. Hill were speaking of the cure of *Stricture* instead of *gleet*, the description of the method could hardly be improved; but to say that the cure of a gleet is immediate, complete, and permanent, after the operation on the Stricture, is what I do not desire to claim. I would be understood as holding that *Stricture is the cause of gleet*, and that *its removal* is necessary to the permanent cure of gleet I have already alluded to conditions, implications of deep follicles and sinuses, etc., which may prolong the gleet indefinitely after the cure of the Stricture. The removal of the Stricture or Strictures is the *first* condition of permanent cure of gleet, and in the *majority of cases*, after this is accomplished, the gleet will cease, without other treatment, in from one to four weeks after the healing of the wounds. But in exceptional cases the condition before alluded to—the legitimate results of Stricture in certain individuals—will keep up

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the gleet for an indefinite period, and must be treated on general principles, final success depending upon the character of the especial complications, the knowledge, skill, and ingenuity of the surgeon in charge of the case.

Finally, Mr. Hill proceeds to consider the results of operation on his sixteen cases, all of which he fairly states were in individuals "who had long-standing gleets, with contraction in one or more parts of the spongy urethra, and had undergone multifarious treatment." Strictures were examined for, and found. They were operated on in supposed accordance with the method previously described, and five out of the sixteen cases operated on by Mr. Hill were promptly cured of both Stricture and gleet. A sixth, operated on by me, was reported cured, after five months, "by other means." In the remaining ten, recontraction of the Strictures took place, and the gleet persisted. Why? Evidently because of the recontraction of the Strictures. And why did the recontraction take place? Why did the Strictures disappear completely in five cases and reappear in ten? Simply, as I apprehend, because in case of the latter *the Strictures were not completely divided.* This is not remarkable, it seems to me, under the circumstances, although Mr. Hill used his own ingenious modification of my dilating urethrotome, and observed all the principles necessary for the successful performance of the operation in these ten unsuccessful cases. *Complete* division of Stricture, in my experience, cannot be demonstrated at the time of the operation. A certain amount of distension is necessary to fix the Stricture before it can be completely divided; hence a sufficient time must elapse after the operation to test the question as to whether the Strictures are, or not, completely divided, and this is never less than ten days or two weeks. If after this time an examination with the full-sized bulbous sound shows complete freedom from Stricture, there need be (judging from my own experience), no fear of any return of Stricture. If, on the contrary, remains of Stricture are detected, it is the evidence of incomplete division, and the operation must be repeated,

and the remaining fibres severed. Without *complete and absolute sundering of the Stricture* to its ultimate fibre, recontraction sooner or later is *certain.* It is not a question of using my urethrotome or Mr. Hill's, or any other special instrument, but one of principle. It is not a question of whether division of Strictures may be effected by one operation or ten; neither the permanent cure of Stricture nor of gleet can be reasonably expected, while a fibre of the Stricture remains undivided. Let the sundering be complete, and proved by a re-examination at a period sufficiently long after the operation to give security against mistaking *over-distension* for *complete division,* and I will not hesitate to take the responsibility of claiming ultimate *absolute permanent* removal of urethral Strictures.

In describing my urethrotome, Mr. Hill is somewhat in error. He says: "A small cutting edge, previously concealed at the end of the dilating part, is drawn along the tightly stretched tissue to the meatus, . . . making a long furrow in the mesial line in the root of the urethra." He further says: "Disliking this long cut, which divides uncontracted parts, I have employed, except in one case, a Stricture incisor which, while it stretches the urethra to the size previously determined, cuts only where it is strictured." *My object has always been to divide only contracted tissue.* Strictures have been carefully located and measured before operation. The knife which is concealed at the end of my instrument is drawn through the Stricture and at once returned to its concealment. If other Strictures are present, the instrument is especially readjusted for them.

Mr. Hill records against my mode of procedure "persistent bleeding" in four cases; "rigors" in three; "abscess in the buttock" in one; "crook of the penis" in one; "orchitis" in one. This certainly looks like a formidable array of accidents to occur in sixteen cases. 1st. In regard to "persistent bleeding." This accident, (if accident it can be termed in cases where vascular tissues are freely and intentionally incised,) may always be readily and easily controlled.

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Simple compression by an ordinary bandage will *always* stop it in the spongy portion of the urethra. The introduction of a flexible tube after the operation will *always* prevent it. The magnitude of the object to be attained will warrant the employment of either or both of these simple measures in every case, and will give security, perfect and complete, against any injury from hæmorrhage. 2d. "Rigors" occurred in three cases. The simple passage of any instrument through the curved or fixed portion of the urethra may alone suffice to produce this accident, and would be still more liable to result upon dilatation of this part. My plan is never to pass beyond the bulbous urethra if it is possible to avoid it, and my own urethrotome has been contrived expressly with the view of dividing Strictures, as far as the bulb, *without entering the fixed portion of the urethra.* Acting on this principle, rigors have not occurred in more than one out of a hundred cases, in my experience. From this I am able to state that all operations confined strictly to the penile urethra are virtually free from danger of this accident, or from any marked constitutional disturbance, except in cases habitually subject to this trouble. 3d. "Abscess of the buttock" is recorded against one operation. This might be accepted as accounting for the rigor which it may be presumed occurred in this case, but cannot be entertained as the result of the operation upon the penile urethra. 4th. "Orchitis" followed the operation in one case. Orchitis is recognized as occurring not unfrequently from the simple passage of any instrument through the curved portion of the urethra. I have never met with it as the result of any interference with the spongy portion of the canal.

In one of Mr. Hill's cases—that operated on by myself—persistent bleeding is noted, and notwithstanding the assiduous passage of sounds, his gleet persisted for five months ("until Christmas"), and was then cured by other means; and, besides, a scar or induration remained in the erectile tissue which gave a crook to the organ on erection. It seems to me not irrelevant to state that this case was operated on

by me in the theatre of the University College Hospital under the impression that he was to receive care immediately after the operation. It turned out, however, that he was an out-patient. He subsequently drove his van for several miles, then walked a couple of miles, and returned at about 10 P. M. to the hospital, was subjected to treatment for his hæmorrhage, and had some constitutional disturbance for several days. I think that the inflammatory complication, which undoubtedly caused the induration in the erectile tissue, would rarely occur in cases where the necessary care and rest are insisted on.

Out of between five and six hundred operations I have seen six cases followed by the crook or curvature to which Mr. Hill alludes, in the worst case persisting about a year; but in all of these inflammatory trouble succeeded the operation. In two a urethritis was present, which had persisted acutely for several months, and in the others, extensive, very dense, and deep Strictures were divided. It is a question whether this rare accident would ever occur if the Strictures were uniformly divided on the floor of the urethra, as Mr. Hill is in the habit of doing. My cases were all cut superiorly and in the median line, as I believed I could more certainly sunder the Strictures in this way, and with less liability to troublesome hæmorrhage. I am at present making observations with the view of ascertaining the best point for division, and I may ultimately coincide with Mr. Hill in incising Strictures on the inferior floor of the canal.*

The final cure of gleet in the last mentioned case is stated to have taken place five months after my operation, "by other means." At the date of operation it was one of the "cases of long standing, with contraction in several portions of the canal, and had resisted multifarious treatment." Is it quite certain that this case was finally cured by other means, and that the cure was not chiefly due to removal of the

* A large subsequent experience has satisfied me that not only in regard to trouble from hæmorrhage, but in regard to completeness of results, the superior incision is greatly preferable. June, 1878.

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Strictures? I rather incline to the opinion that the continuation of the gleet was due to the "cicatricial knot" which followed the operation and complicated the case; and its gradual absorption (usual in such cases) removed the remaining source of irritation, and the gleet ceased. In Mr. Hill's own fifteen cases one-third were promptly cured. In the remaining ten *recontraction* took place: this, it appears to me, is a good and sufficient reason why the gleet should persist; and I feel confident that the results of *thorough re-division* of these Strictures would go far to establish the truth of my views.

In closing his lecture, Mr. Hill objects to any examination of the urethra for Stricture until the gonorrhœa and gleet shall have lasted for six months. It is a well-known fact (see Thompson "On Stricture," English edition, p. 115) that Strictures are often present from other causes than a gonorrhœa; that a gouty or rheumatic diathesis, etc., may cause them, and that even a first gonorrhœa is often aggravated and prolonged by them. Is it then wise to ignore for a long period a well-recognized cause of trouble when the alternative is a prolonged and possibly a useless, if not harmful, course of urethral injections and nauseous medicines? However much we may deprecate unnecessary instrumentation, we cannot lose sight of the fact that *unnecessary injections and unnecessary medication* are quite as much to be deprecated. A careful, judicious, and thorough urethral examination immediately after the acute stage of a gonorrhœa has passed, I have never found to result in more than a temporary discomfort, and less than often follows the use of a single injection.

I do not claim perfection for any method or means of mine, but I offer my instruments and my experience to the profession, abroad and at home, with the sincere hope that they may be tested in the fair and generous spirit shown by my friend Mr. Hill, and that ultimately we may arrive at the solution of the most vexed of all surgical problems—viz., the best way of curing Strictures and gleet.

CHAPTER XI.

DISCUSSION CONTINUED.

THE next public discussion of my position on urethral questions appeared in May, 1877, in the Maryland Medical Journal, by Dr. Thomas R. Brown, Professor of Clinical and Operative Surgery, and of Diseases of the Genito-Urinary Organs, in the College of Physicians and Surgeons, Baltimore. This critique is considered worthy of citation because of the practical efforts which Professor Brown has made to solve the questions most in dispute, and especially on account of original observations of the fœtal urethra, and that of the newly born (page 243,); important as bearing upon the significance of the dilatation usually found in the anterior part of the adult urethra heretofore described by anatomists as a normal condition, and called the *fossa navicularis*, but which I have claimed to be the result of mechanical dilatation behind a contracted meatus urinarius.

Again at page 242, he raises a point or two in regard to estimates of size of urethra from circumference of penis, which may have a general interest, while on the same page he confirms them in citing a case with a penis $4\frac{3}{4}$ inches in circumference, associated with a urethra 47 mm. circumference, perhaps the largest on record. Again, ibid., his experience as to most frequent locality of Strictures; in 100, 75 per cent. anterior to $4\frac{1}{2}$ inches, confirms the claim made page 97, as against previous authority. Again the emphatic endorsement of my claim as to the importance which may attach to Strictures but slightly invading the urethral lumen, page 192. Professor Brown's opinions have an especial value from the fact that his position heretofore, has been in a measure antagonistic to my own.

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Citation.

DURING the past three years the attention of Genito-Urinary surgeons has been especially invited to the study of urethral Strictures, their pathology and treatment. The fresh interest in this subject is, in great part, due to the new departure of Professor Otis, as to what constitutes a Stricture. Heretofore, the French surgeons have taught that an urethra through which a twenty-one of their scale could be passed, is free from Stricture. According to the English school, if an eight or nine of their scale can be passed into the bladder, no Stricture can be said to exist, while the American standard of 31½ millimetres was quite universally accepted as correct. In opposition to these current views, it is claimed, as the outcome of many experiments, that there is no such thing as a "standard urethra" which applies to every man any more than a standard hand or foot, but that they vary in size in different individuals, according to the physique. So the urethra varies with the size of the flaccid penis. It is moreover claimed that this variation is definite and according to a rule; beginning with a penis three inches in circumference, its urethra would measure 30 millimetres, and for every ¼ inch increase in the circumference of the penis, there would be an urethral increase of two millimetres. These results have been verified by Otis in nearly all of 500 examinations. The establishment of this proportionate relationship, if sustained, would be a valuable addition to both anatomy and surgery, and for the purpose of testing its correctness many investigations have been made—notably, by Drs. Henry B. Sands, Weir, Mastin and myself in this country, Teevan, Watson, Berkeley Hill, Cooper and Coulson in Great Britain—with a result that is anything but satisfactory.

The second proposition and perhaps most important in a practical point of view, is that which relates to results of treatment. It is insisted upon, and if true the argument is a sound one, that operations performed in accordance with the rules laid down, followed by the proper after-treatment,

yield perfect results and complete cures, cures so complete that the previous seat of Stricture cannot be detected by a properly sized olive sound, and so complete that the danger of re-contractions no longer applies,* enabling the patient to dispense with the dependence upon the introduction of the sound for the purpose of keeping his urethra open.

The fourth point is, that by far the most Strictures, in fact nearly all, are found in the spongy urethra. This contrasts with Sir Henry Thompson's position, who locates sixty-one per cent. in the membranous, or bulbo-membranous part, and is doubtless to be explained by the fact that the anatomical basis of the former's collection of cases and that for the latter, are distinct and dissimilar. The coarser procedure of the one ignored, as having no existence, what the more refined method of the other esteems important and demands treatment. Hence it is that we hear so much of late about Strictures of large calibre; not only because they are morbid conditions of themselves, but chiefly because they are apt, if let alone, to go from bad to worse, and sooner or later impair seriously the efficiency of the organ. It will be observed that this advance seems to take no account of the by no means dis-established assumption, that slight constrictions not only may be present, but may become harmless in the course of time, undergo absorption, or by a process of infection, (strictly rendered) take on the structure and function of the tissues in which they are seated.

These are the salient points of this new method, and the importance of keeping our premises constantly in view must explain this reference to what, after a fashion, is already before the profession. And whilst we must admit that the author has conducted his investigations with commendable fairness and zeal, we must also regret that his challenge of criticism has not been accepted. We have had any amount of *à priori* reasoning presented against his formidable

* See reference to report of Prof. Alfred Post, Drs. Miner, Woodruff, upon an examination of patient operated upon for five (5) Strictures "with complete absence of a trace of Stricture." N. Y. Med. Journal, April, 1878.

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array * or on the other hand such complacent acceptance of the claims, both alike damaging to the cause of truth, that we would pronounce not so much "not proven" but "not tried." The trial has made little progress, the case is still open with all the presumptions necessarily favorable to Dr. Otis's side Let us briefly consider some of the results of the trial as far as it has progressed.

As to the question of the normal urethral calibre, Sir Henry Thompson, who has all along been the great champion for small sounds, has recently admitted that † "he had long seen the practical necessity of a higher estimate of the normal urethral calibre than that generally assumed." With this sentiment Mr. Berkeley Hill, of the University College Hospital, London, agrees, and for the sake of illustration I quote the following of his:

"I did Syme's perineal section in a case of traumatic Stricture lying in my wards, and who had been several weeks in Guy's and St. Bartholomew's Hospitals, and under private treatment before he came to me, without any instruments having reached his bladder, I measured the circumference of his flaccid penis, and found it 3¼ inches. I turned to my audience and said: 'now according to Dr. Otis's observations, this urethra should easily admit 32 F.' I took up 32 F. sound, (at the size a general murmur ran round); I placed it in the meatus and it slid down to the bulb quite by its own weight. Then it was stopped of course by the Stricture. I then proceeded to divide the Stricture upon a Syme's grooved and shouldered staff in the perineum; the thick part of the staff was No. 26. I held it up to the audience along with the usual one of No. 16, to show the difference. After division I took the 32 F. sound again and slipped it readily into the bladder." In connection with another case he states, "I divided a contracted meatus this afternoon in a private

* See Sands "On the Causes of Gleet and Calibre of the Male Urethra," New York Medical Journal, March, 1876. R. F. Weir, New York Medical Journal, April, 1876. Boston Medical Journal, November, 1876.

† British Medical Journal, Feb. 26, 1876.

patient, (his own doctor being in attendance); after which No. 39 F. passed readily down into the bladder, as I had announced that it would when I measured the canal with the urethra-metre. I then made the practitioner pass the 39 himself, in order that he might be sure that there was no hocus-pocus in the matter." Testimony of this character must carry weight, especially when it is considered that the cases cited evidently constitute parts of a series. It is scarcely necessary to argue farther, this need for a higher estimate of the normal urethral calibre. So far as my own examination of nearly one hundred cases extends, while not prepared to affirm that the *exact proportionate* relationship between penis and urethra exists, I am convinced that the capacity of the urethra is much greater than has been supposed and that the size of the urethra bears some ratio to the penis. It is important to state here that all of my measurements were made with the urethra-metre, a most invaluable instrument. The amount of benefit, however, derived from its use depends upon the skill and delicacy acquired by long education in its manipulation. And under no circumstances must the "limit of easy distension" apply to the patient, except to a minor degree. That "feeling of fulness" referred to the patient, "sense of distension" must be regarded as too varying to make it the "*sine qua non*" of a grave surgical operation. As stated above, my examinations do not justify me in conceding the relative size of penis and urethra, so far as the measurements of the latter were made with the urethra-metre. This may spring from a want of proper tact in handling it.

In certain examinations it was quite evident that the same penis in a state of flaccidity may vary in its dimensions, when exposed under different temperatures, also that there were variations in different parts of the same organ—the point near the peno-scrotal angle measuring less than immediately behind or at the corona glandis; in fact does not the nature of the tissue of which the penis is made up suggest such conclusions? Under such circumstances as these what part must

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be selected as standard?* With the statements of Prof. Sands, and Dr. R. F. Weir, that contractions occur in different parts of the normal urethra and are not prima facie evidence of disease, as indicated by a series of eight carefully prepared wax casts, my investigations do not agree. In all instances where obstructions to the easy movement of the urethra-metre were met with, there was abundant reason for suspecting disease. The converse is equally true that where the urethra was found to be normal, the withdrawal of the instrument was accomplished without resistance. These and the post-mortem experiments serve to convince me that constrictions do not belong to normal urethræ, and where they do exist they must constitute the rare exceptions. It is a curious fact, which seems to have gone unnoticed, that in both of the collections of casts referred to the principal narrowings were in the anterior half of the urethra, a possible effect of the injection not continuing in the same state of liquefaction throughout, or again, if this supposition be not correct, might not these few cases when placed beside Prof. Otis's 500 cases, be classed with urethræ in a state of disease. This is especially probable when we recall the fourth proposition as to the most frequent site of Stricture, a position which I fully indorse. Out of nearly 100 Strictures divided by myself, including many that are usually designated as impermea-

* The estimate of the size of the urethra from its proportionate relation to the size of the penis, is but approximate and intended only to serve as a guide where the urethra-metre is not available. Examined by the rule laid down p. 89, experience has shown that the estimate will never exceed the normal calibre, though it often falls short of it several millimetres circumference. The flaccid penis is subject to variation from heat, cold, etc., but practically it will be found that the relative conditions will always be the same *when the patient presents to the surgeon*. Measurements should always be made at about midway of the body of the penis.

In a recent edition of the standard work of Prof. S. W. Gross of Philadelphia, on the genito-urinary organs, edited by his son Prof. L. D. Gross, he says (in a note following his illustration and description of my urethra-metre, page 472) in regard "to the proportionate relation between the penis and the urethra," "From a number of measurements made upon private and hospital cases, the Editor is enabled to add confirmatory evidence of the correctness of Dr. Otis's estimates." —F. N. O.

ble, at least 75 *per cent.* were found within the anterior $4\frac{1}{2}$ inches. I am therefore led to infer that those deeper constrictions are nearly always the consequence of extension of disease from in front. With reference to the controversy as to the existence of the boat-shaped dilatation—the fossa navicularis—I have been forced by my post-mortem, rather than by the urethra-metric inquiries, to consider it to be the rule for this, or at least some form of dilatation to be found. In my examinations, not exceeding a dozen, to be sure, made according to the directions of Malgaigne and Thompson, it was always present. I feel however almost convinced that it is acquired and not congenital, and dependent upon the constant and increased tension to which this part is subjected in the resistance to the exit of urine offered by a contracted meatus. For the purpose of determining this point, I have examined a number of fœtal and infants' urethræ, some of them in the presence of my colleague Prof. Bevan, and up to this time I have met not *a single one* in which this dilatation occurred. In all of these examinations the meatus was invariably found to be narrower than the rest of the canal. As an evidence of how utterly unreliable our hitherto arbitrary mode of excluding Strictures really is, I would cite from among a number, the case of Wm. ——, in attendance upon my clinic, as an out-patient, at the College of Physicians and Surgeons. The size of his penis was $4\frac{3}{4}$ inches, and upon introducing the urethra-metre, and expanding it to what I believed the proper size, the indicator marked 47 millimetres. Without any more than the usual discomfort, and but very inconsiderable pain, it was withdrawn easily along the entire urethra, it only becoming necessary to diminish the bulb at the meatus, and at that point to 35 millimetres. Now in this case, how very unreasonable it would have been to have allowed the introduction of a No. 8 or 9 of the English, 21 of the French and $31\frac{1}{2}$ of the American scale to effectually dispose of the question as to whether there was Stricture in that man's penis or not, when not one-half of its normal calibre had been ascertained. And even taking his meatus as the

guide, its indication would have fallen short to the extent of 12 millimetres. I am therefore compelled to agree with Prof. Sands, that "in practice we find in the size of the meatus a rough test for the calibre of the urethra," a test indeed so very rough and unreliable as to preclude our making any use of it in an operation which has for its object a complete division of the Stricture.

From what has been said, I am forced, with the qualifications stated, to agree with the principles contained in this postulate, and to decide that the old methods of examinations abound in faults. Under its teachings very decided disease must have been overlooked, and an easy explanation of the intractability of that bugbear gleet, now recognized as the offspring of Stricture, obtained. In passing I may state here that this dependence of gleet upon Stricture has been greatly misunderstood, because when the Stricture has been effectually divided, the urethral discharge did not cease. Many have considered this to disprove the connection, but this is obviously unjust, for the reason that the Stricture was not the gleet *per se*, but the cause of it, and in a way easily to be explained. The obstruction favors the accumulation within the urethra of residual urine bound to undergo decomposition. This urine, acting as an irritant, constantly applied, especially to the sinuses of Morgagni, induces a chronic catarrh, which requires after the division of the Stricture, treatment of the most persistent, discouraging character. As it is true that all acute diseases tend towards recovery, it is equally true that all chronic diseases tend, with as much emphasis, in an opposite direction. This, we all must admit, holds true of gleet. I am not prepared here to explain those cases of gleet, wherein the discharge had continued over such a period that analogy would warrant an assumption of Stricture, and which are said to have disappeared entirely upon expectant treatment. I can only say that I have met with no such cases during these investigations, and feel inclined to question the completeness of the alleged recoveries. On the other hand, I have met with a number while presenting a

somewhat similar history, they have, in addition, complained of a peculiar susceptibility to contract "fresh cases" of what they called gonorrhœa or simple urethritis, contracted whether after legitimate or illegitimate sexual indulgence; after "taking cold," or after slight excesses in eating or drinking. By way of illustration, I extract from my "Case Record" a brief synopsis of two cases:

Case 1. Mr. —— Jr., contracted four years ago a case of gonorrhœa, which after the usual treatment and a long time "got well." Has noticed since that time that scalding with urination and a discharge would follow sexual intercourse. This discharge, which the patient states, is like that in his previous attacks, when seen by me, was not the frank, purulent discharge of gonorrhœa, but was decidedly more serious, though the usual symptoms of irritation were present. I observed that during urination the stream was too small, somewhat twisted and followed by dribbling. An attempt to pass 32 F. was made but failed, this being the size indicated. Before the canal could be traversed, it became necessary to use the smallest olive in my possession, which is marked 13 F; the contractions being so considerable as to prevent the use of the urethra-metre, until after a Thompson's divulsor had been introduced and dilated. Three distinct Strictures were made out—one 3 inches, the second 2½ inches, and the third 1½ inch from the meatus, all of which were completely divided. Now this man considered his penis well, except as to these recurring attacks of gonorrhœa.

Case 2 presents almost identically the same history, except as to the number of Strictures, there being but one, and as to the suspected cause of his urethral attacks—"cold." The Stricture, located in this instance 2⅛ inches from the meatus, was alike perceptible to myself and to his physician, Dr. Saltzer, of Baltimore. In both cases, the usual after-treatment of the tri-weekly introduction of the proper sized sound was followed out strictly and with good results.

Another point, in this connection, is the alleged insignificance or harmlessness of Strictures of large calibre. Before

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accepting this there is need for more extended observation. I fully endorse the claim of the pathologist that this simple cicatricial tissue is liable to increased hyperplasia and liable to become not only a more and more serious condition in itself, but also liable, even in its early stages, to produce consequences that may prove dangerous and even disastrous. If space permitted, I should like to give the details of two cases in point; the first that of a man dying in the Hospital of the College of Physicians and Surgeons from toxæmia consequent upon extravasation of urine through a hole in the urethra 1½ inch long, beginning just behind a Stricture through which a No. 12 Van Buren's conical sound could easily be passed. The second case occurred in the practice of Mr. Walter Coulson, of the Lock Hospital, London, and is reported in the *Lancet* of August 28, 1875, pages 332.333; in which perineal fistules refused to heal after the usual section, until some Strictures of large calibre, anterior to the fistulous openings, were freely divided. After this the patient entirely recovered. The anterior Strictures were large enough to admit a No. 10 E., and still they offered sufficient resistance to the flow of urine to keep the false passages from healing. I do not mean in either of these cases to dissent from the now generally accepted opinion, that perfectly normal urine is innocuous even when injected under the tissues, but, more than probable, in both of these the urine was not normal.

These are some of the notes which I have wished to make about that which I hope and believe will become a valuable addition to our fund of surgical knowledge. At some future time I propose to extend these comments, especially with reference to the results of the operation, not sufficient time having as yet elapsed to make me willing to venture an opinion. I feel justified in stating, even now, that I have made re-examinations where the Strictures have been completely divided, nine months after the operations, without finding re-contractions.

In reply to a letter asking for information, Prof. Brown writes, under date of April 5th, 1878, as follows: Upon the

whole a careful study has made me a convert, in the main, to the principles of your procedure, and I never think of considering any of my operations complete, until the indicated sound as well as bougie-à-boule has passed 'sans resistance.' I have, moreover, very certainly, by inviting sceptics to many of my operations, served to dismantle the old *doxies*, and, by doing the Otis operation, have been instrumental, in a measure, in dis-establishing the false views which have so long obtained. *I have divided over* 300 *Strictures without a single death.* * * * Every day convinces me more and more of the great importance of free division of the Stricture, with a view of preserving the normal calibre of the urethra. With regard to your claim of the relative size of the urethra and penis, on the careful observation of an immense number of cases it has never happened to me to find, for example, a penis of three inches with a urethra measuring less than 30 mm., but I have found a large number where the urethra measured more."

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CHAPTER XII,

Report of thirty Operations for Urethral Stricture, Otis's method, by Claudius H. Mastin, M.D., LL.D., of Mobile, Ala.

DR. MASTIN writes, May 16th, 1877, "It affords me pleasure to testify to the value of your method of operating for urethral Stricture. Before I had resort to dilating urethrotomy, I thought it impossible to make a radical cure in these cases; but since I have given it a fair trial, I have changed my opinion, and I now unhesitatingly say, I believe that certain selected cases can and will be *cured* by your method, provided the operation is judiciously done, and the after treatment properly conducted. To this date, my cases of Internal Urethrotomy number 280. They have been performed with a variety of instruments, Maisonneuve's, Civiale's, Ricord's, Otis's and my own. I have as yet, never met with an accident, nor have I lost a single case.

I have used your dilating urethrotome in some 30 cases, and I feel justified in saying, that it is especially adapted to all cases of hard, firm, organic Stricture in the *penile* urethra; especially is it valuable in those cases of chronic urethral discharge dependent upon what you term, "Strictures of large calibre," and I believe that when the profession comes to know and understand the operation, no surgeon will consider himself prepared to treat urethral affections, unless he has "an Otis urethrotome."

If the cases are properly prepared for the operation, I do not see that there is any more danger in your operation than in any other.

Hæmorrhage in my opinion, is not more liable to occur after your operation, than after any other, and even should it take place, it can be speedily and easily controlled.

I believe that the success of every operation for urethral Stricture, by the knife, depends upon the amount of *cicatritial splice* which we gain after an operation, and as the operation which you have devised insures a wider splice than any other that I as yet know of, I say, unhesitatingly, your operation is, in my opinion, the operation best calculated to produce a perfect and radical cure.

In Strictures of long standing, with great density of tissue deposited, I do not believe that any other urethrotome, save Otis's or one constructed upon its principle, will or can give the same satisfactory results.

The following cases are taken without selection from the list of operations which I have done with the "Otis urethrotome," and will go to show the results of his method in my hands. I give them just as they have been taken from notes, without, however, going into detail as to the preparatory or after treatment, which is usually resorted to.

Case 1. Geo. S., an engineer, aged about thirty, had suffered from Stricture in the penile urethra for about three years. He had been operated upon with a Maisonneuve urethrotome two or three times; but with no other benefit than to give passage to his urine. Constant dilatation had been resorted to without benefit; he suffered from a painful irritation of the entire urethra, and was annoyed with a perpetual discharge. I found him at the time he presented himself to me on the 25th of December, 1874, using a No. 28 F. sound, which he informed me, had been given him by his former surgeon "to keep the urethra open." Upon examination (by Dr. Otis's rules, and by the use of his urethra-metre) I found the normal size of his urethra 36 F. After due preparation, I operated upon him on the 28th day of December, 1874. Carried out the after treatment with large sounds, until the last of January, 1875, when I discharged him, apparently entirely relieved. Since then, now over two years, I have had him constantly under observation, and have fre-

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quently examined him, both with the ball probe and the urethra-metre, and, to this date, I have been unable to find any recontraction.

Case 2. Mr. O. C., master mechanic, aged forty-two to forty-three, presented himself for treatment of urethral Stricture, which had existed for some four or five years. An examination revealed two Strictures of large calibre located in penile urethra—one about 2½ inches down the urethra, the other just in front of the bulb. He informed me that he had been operated upon by divulsion, by internal urethrotomy, with a Maisonneuve's urethrotome, and been treated by caustics and continuous dilatation. He came to me on the 14th of February, 1875. I found that his Strictures would admit a No. 28 F., and that there was a good deal of irritation and a very free discharge. His normal urethra according to rule, furnished a calibre of 38 F. To this point I cut him with an Otis urethrotome, and treated him with large sized sounds until all discharge had ceased, and his urethra offered no resistance whatever to the ball probe or the urethra-metre.

I have been particular in keeping this case under close observation and frequent examination, and I defy any surgeon to find a trace of contraction present. He has had, and there now remains some prostatic trouble, unconnected however with the former Strictures.

Case 3. D. S., a barber, aged fifty-two, presented for treatment on 5th September, 1875. I found a tight, firm Stricture, 2½ inches down urethra; opened it with small blade of Maisonneuve's urethrotome, 8 mm. in diameter, through which I passed Otis's instrument, and cut the same to the normal urethral calibre which was 35 F., I treated him with large sounds, and discharged him on the 1st of October, 1875, as cured. Careful examinations reveal no contraction up to this date (May 16, 1877).

Case 4. A. B., drug clerk, twenty-five years, presented for treatment November 7th, 1875. Examination revealed close Stricture in penile urethra, 2½ to 3 inches down, normal urethra 33 F. I cut him with the Otis urethrotome, and

treated him as usual after these operations. To date no complaint, and no evidence of any recontraction.

Case 5. J. C., lawyer, twenty-two years; recent Stricture in penile urethra; normal calibre 32 F. I cut this Stricture only to 31 F., and tried to dilate with large sounds up to 32 F. He objected to the continued use of the sound, and said he thought he would be cured without their use. The end of this has been, the Stricture has in a measure recontracted, the discharge returned and he has placed himself under care, for treatment. I consider the failure, for a failure it has been, is entirely due to my negligence in not cutting the Stricture up to 32 F., and then keeping up the use of the sounds until all irritation and discharge had ceased.

Case 6. J. S., broker, aged thirty-one; Stricture of large calibre in penile urethra, three inches from meatus. Constant discharge. Has been treated in Galveston, Texas, by sounds, injections, etc. Came to Mobile in April, 1875. I found normal urethra 32 F. Operated upon him May 1st, 1876; treated him by usual method. He had a severe attack of urethral fever, after the operation; had been subject to rigors after every urethral interference; yet he has promptly recovered, and in February, 1877, I examined him and found no evidence of any return of Stricture. His health has improved vastly, and he expresses himself as perfectly well.

Case 7. S. F., merchant, aged twenty-eight years. Stricture of large calibre; a very troublesome discharge, and general health disturbed. Stricture located in the penile urethra, just in front of bulb. Normal urethra 35 F. Operated upon him July 6th, 1876; cut with Otis's urethrotome. Results perfect. No contraction as late as April, 1877. General health greatly improved, discharge entirely relieved, and says he is as well as he ever was in his life.

Case 8. J. P., bookkeeper, aged about twenty-six years. Stricture of large calibre in penile urethra three inches from meatus, general health failing; great anxiety of mind; has been under care of a physician for some months who told him he had prostatic disease, etc. Used small bougies, injec-

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tions and porte caustics, until he presented himself to me for treatment Dec., 1876. I found no prostatic trouble, but a very irritable urethra, of normal calibre 35 F. and a Stricture contracted to 28 F. I cut him with Otis's instrument, on December 8th, 1877. He improved rapidly, and to-day is in better health than he has been for two years past. All discharge has vanished; there remains no irritability of the urethra, and I am unable after the most careful examination to find a trace of strictured tissue. I believe that time will prove that his cure has been perfect.

Case 9. R. M. Q., bookkeeper, aged forty years. Stricture at bulb; says he has had Stricture from early boyhood, result of an injury received by riding on the pommel of a saddle. There is a great deal of urethral deviation, the penis being twisted full one-third around on its axis.

I saw this case first in Sept., 1869, just after an attack of retention. I then cut him with a Maisonneuve urethrotome, followed by that of Civiale, and furnished him with sounds up to thirteen and fifteen English measure, with instructions to keep his urethra open. This he neglected to do, and permitted his Stricture to contract so much that it seriously interfered with the passage of his urine. He said he disliked to come back to me, after neglecting instructions, so he put himself in the hands of a physician, who divulsed his Stricture with a Holt divulsor, and told him he was cured. This divulsion was in 1870, sometime in the fall of the year; but instead of curing his Stricture, he was made worse, for on March 19th, 1871, he placed himself again in my hands with a Stricture contracted to No. 1 French. He now objected to any operation, and requested that I would dilate his Stricture "just enough to permit him to urinate and he would be satisfied." In the course of a few days I had opened his canal so that it would admit a No. 10 English catheter. He now thought he could keep it open, and declined any further treatment. I heard no more from him until the 25th of May, 1872, when he sent for me to relieve him of retention. I found his Stricture impassable, and after a fruitless trial of over two hours, to

get through the Stricture, even with the smallest whalebone probe, I frankly informed him that the only alternative was either to tap the bladder, or open the urethra in front of the Stricture, and then work through the co-arctation. He preferred the latter, and I at once performed my modification of *la Boutonnier*. His recovery was rapid, and every thing gave promise of a successful termination of his troubles, but during the summer of 1875, he contracted a blennorrhagia, which proved rebellious to treatment and caused his Stricture to recontract enough to give him considerable trouble and anxiety about his urination. Fearing retention, he came to me for another operation, and I proposed and performed the operation with the Otis urethrotome on the 29th day of Nov., 1875. I opened his Stricture to 32 F., that being the normal size of his urethra. To this date, 16th May, 1877, I can find no evidence of any Stricture remaining. In fact he is much better than after any previous operation which had been done.

Case 10. R. B. M., gentleman aged 29 years, May 19, 1875, presented himself, with a firm Stricture in penile urethra, great irritability of urethra and considerable discharge. Had been operated upon by some physician, as the patient informed me, with a "sort of spring instrument," cutting from the point. I suppose it was an old Stafford's instrument. There had been no results beyond increasing the discharge and inflammation.

I found his Stricture would admit a 23 F. sound, and his urethra a 32 F. in its normal portion. I cut him to this point; treated him about thirty days with large sounds, and he has remained perfectly well ever since. Recent examinations reveal no evidence of any recontraction.

Case 11. J. L., wine merchant, from Ohio, aged 32 or about that number of years, presented himself on 10th February, 1877, with Stricture in penile urethra, just in front of bulb. Has had retention on two occasions. Stricture hard, discharge purulent and in large quantities. His Stricture would admit 25 F., and his normal urethra was 32 F. I cut

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him up to 32 F., treated him with large sounds, and at the expiration of fourteen days, as he was so much relieved, I concluded to venture upon letting him return home. To-day, May 16, 1877, he called at my office, as he was passing through Mobile, and I found his urethra *perfectly* smooth, with no discharge and no Stricture.

Very sincerely,

C. H. MASTIN, M. D.

Out of thirty operations reported by Dr. Mastin, twelve cases are quoted in full, and of these complete radical cure of the Strictures is claimed in nine cases, as proved by re-examinations as follows:

One	2	years	and	6	months	after	operation.
One	2	years	"	4	"	"	"
One	2	years	"	0	"	"	"
Two	1	"	"	9	"	"	"
Two	1	"	"	6	"	"	"
One	0	'	"	10	"	"	"
One	0	'	"	4	"	"	"

CHAPTER XIII.

Report of seventy-one operations for Stricture—by Otis's method (45 *Tabulated Cases.*) *By R. W. Pease, M. D., Prof. of Surgery in the Syracuse University, N. Y.**

IN 1874, a gentleman whom I had treated for Stricture of the urethra at the membranous portion, for several months, and who, prior to coming under my care, had been treated by most capable physicians, one a world-known surgeon, drifted away from me, because I, like those who preceded me, had failed to give him any relief by the stereotyped method of treatment—the use of bougies.

His symptoms, in brief, were a desire to frequently micturate flocculent urine, and a constantly recurring gleet. The protracted malady had sadly undermined his health, as evidenced by great nervous irritability, induced by his disturbed rest.

Fortunately, he came under the care of Professor Otis, of New York.

The diagnosis made by Professor Otis was a Stricture one-half inch from the meatus, and none at the membranous portion. The meatus was cut to 40, French scale, that being the capacity of his urethra, and in a few days he returned to Syracuse, every symptom mitigated, and in a few weeks all evidence of contraction of the urethra was removed, the urine cleared up, the nervous symptoms dissipated, and, in short, the patient cured.

My patient was a gentleman of great intelligence, and his representation of the methods used to diagnose the difficulty, together with what I had incidentally seen, in the journals, of Professor Otis's views and practice in urethral surgery,

* Read before the Medical Society of the State of New York, June, 1877.

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added to my own growing dissatisfaction with the results of treatment as universally employed by the profession, led me to a careful investigation of his methods of diagnosis, and treatment of Stricture.

This review has brought me to the following conclusions:

1st. That the means of diagnosis usually employed in detecting Strictures, is exceedingly faulty, as the bougie frequently fails to locate, or even to give the least indication of contractions that are causing serious disturbances.

2d. That there is a definite relation between the circumference of the flaccid penis and the circumference of the urethral canal.

3d. That this law established, the treatment of urethral Stricture is immensely simplified, and the chances of its perfect cure greatly augmented, as by this law we know definitely what must be accomplished to secure a cure, *i. e., restore the canal in its entirety to its normal calibre.*

4th. The metallic bulbs given the profession by Dr. Otis, furnish us with an unerring guide, accurately defining the faintest contraction, and enabling the surgeon to record faithfully and treat intelligently every case that presents itself. This instrument is very completely supplemented by the urethra-metre, which enables the surgeon to define with *one* instrument every Stricture, and, by its dial, measure each contraction without changing instruments.

5th. Having defined the contractions and ascertained the calibre to which the canal must be restored, what are the best means of securing the result? It will be admitted that a Stricture consists of a fibro-plastic band surrounding the entire canal, resilient in character, with a tendency to recontract after dilatation. The end of all treatment has been to promote the absorption of the exudates forming these bands, which have interrupted the canal. It is not for me to specify the various methods which have been resorted to, to accomplish this object, but it will not be disputed, that the profession are nearly a unit in employing the system of gradual dilatation as giving the best results. Indeed, they speak of

curing Stricture by this method. But as to the best that can be done by this treatment, it is sufficient to quote from two authorities, which express the sentiment of *all* the authorities on the subject.

Wade, of London, says: "After the patient is pronounced *cured* by his surgeon, he is obliged to continue the systematic use (always repulsive and often hazardous) of a sound or flexible bougie for the rest of his life."

Hamilton, in his last edition of "Principles and Practice of Surgery," says, "that in whatever manner the relief of the Stricture has been effected, whether by dilatation or rupture, by caustic or incision, the result is the same, the Stricture will inevitably return, unless the use of the instruments is continued. *Once a week, during the remainder of his life*, the patient must introduce a sound or catheter of the size of No. 12, or he may confidently anticipate, sooner or later, a renewal of his troubles."

With this opinion Dr. Otis takes issue, and asserts that in no sense is a Stricture *cured* while such means must be continuously resorted to, to keep patent the passage to the bladder. Having given us an accurate method of diagnosing Strictures, he follows it with the general law of a definite relation of the circumference of the flaccid penis to the circumference of the urethral canal, and to effect a cure, this relation *must be reëstablished.*

My own experience, which now covers more than 100 cases, corroborates the last statement in every instance. Indeed, there is scarcely an exception to the rule, and in every case where the relation has *not* been observed between these measurements, the operations I have made have required repetition. Finally, he has given us the best instrument yet devised to overcome the mechanical difficulties to be encountered.

His urethrotome combines all the good qualities of a divulsor, and supplements it with a blade capable of most accurate adjustment; in this respect superior to the urethrotomes of Maisonneuve and Civiale, as it may be expanded

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to a degree sufficient to divide any Stricture fibres that may be traversed by its blade. Dr. Otis asserts that Strictures divided by this instrument, or by any other, in accordance with the irrevocable law, of complete division of every fibre, followed by the daily use of sounds of the full capacity of the canal, until all bleeding ceases, *will accomplish a speedy cure.*

We have, by the propositions submitted, an accurate and scientific method of treating a dangerous and repulsive disease, instead of an arbitrary, unscientific and universally-conceded unsuccessful means of removing a common and distressing surgical malady. Professor Otis invites the profession to a trial of his methods, to an examination of his statements, and asks, that having examined and tested, we give the results of our investigations and experience, that an intelligent opinion may be formed of what is conceded to be a new departure in urethral surgery, so that it may stand or fall by such honest and searching investigation. In accordance with this request I herewith submit a report of forty-five cases, nearly all of which have been recently examined, and the results of which are presented with an earnest desire that they may incite the examination the importance of the subject demands.

The tabulated statement accompanying this paper contains a number of cases of special interest.

No. 12 was a case of long standing, and had been treated with sounds for a considerable time, but when their use was relinquished, the contraction immediately reappeared, bringing with it a train of disagreeable and painful symptoms. The operations made have effected a perfect cure, as an examination on the 19th ult. reveals not a trace of Stricture. The operation in this case was followed by a downward curvature, which persisted for more than a year. It has now ceased.

No. 16 had been under my care for two years, constantly treated with bougies, and the Stricture persistently re-contracting. The patient is cured, as a recent examination

indicates a canal restored to its normal calibre at every point.

No. 13 is a case full of interest, as showing the reflex effect of these difficulties, as the pain in his testicles and legs has been entirely removed for several months, but reappearing upon recontraction, to disappear again upon severing the strictured bands. When the first two operations were made, I was a novice in this method of treatment, and worked timidly. The last operation shows a satisfactory result, and, I believe, there will be no further return of his difficulty.

No. 21 is a crucial test of the efficacy of thorough division of Strictures by incision, as this patient has been under my personal care for the last ten years, all of which time his Strictures were dilated from 12 to 15 English scale, and the sound constantly indicated contraction at the membranous portion. The bulbous sounds and the urethra-metre defined Strictures at the meatus, a second, at one inch, and a third, at one and three-quarter inches. These were cut by the meatome and dilating urethrotome to 35; when a 34 sound passed by its own weight into the bladder, without obstruction or resistance at the membranous portion—the apparent Stricture proving to have been wholly spasmodic. The result is entire recovery, with his urethra restored to its full capacity. It is more than a year since the operation, and on the 20th ult. there were no signs of recontraction.

Nos. 3, 6 and 11 were cases presenting many points of great interest, but neither space nor time will permit me to comment upon them as they deserve.

If in No. 3 a *perfect* result has not been secured, the improvement is so satisfactory as to at least fill the patient with gratitude. No Strictures remain, the prostatic enlargement is very considerably diminished, the involuntary micturition ended, and manly vigor taking the place of feebleness of body and mind.

No. 31 was followed by urethral fever of a severe character, confining him to his bed for two weeks. All special treatment being suspended during the attack, it was followed

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by considerable recontraction. The second operation was followed by no bad symptom. Recovery complete, as reëxamination one year after evinces.

In two cases, 14 and 26, there was severe hæmorrhage, but there was no difficulty in checking it.

In 26, it is singular that so soon after the operation, the diabetes should have disappeared. I do not know that it had any influence over the diabetic disease—it certainly did not if the difficulty grew out of cirrhosis of the liver, for this progressed to his death; but if the disease depended upon cerebral irritation, then it is altogether probable that it very greatly influenced it, if it did not entirely remove it.

No. 42 is of special interest. At my first visit, July, 1876, I found this patient suffering from acute cystitis, nephritis and urethritis. His age was sixty. Twenty years prior he had had gonorrhœa. Had been treated within a few years for enlarged prostate. At this time he micturated every half hour; bladder, however, could only be emptied by catheter. Otis's urethra-metre passed back to the bulbo-membranous portion, and turned up to 33—not quite the capacity of the urethra—detected, on withdrawal, Strictures at $4\frac{3}{8}$ inches and others not well defined, because of the severe urethritis anterior to this. A No. 12 catheter passed without much difficulty.

The inflammation increased until an abscess formed just anterior to the scrotum, and discharged urine and pus, leaving about four inches from the meatus, a fistulous opening through the raphé into the canal. From this time the acute symptoms subsided, the nephritis gradually ceased, and convalescence was established with the fistula remaining. May 19th, ult. Operated to relieve the Strictures anterior to fistulous opening, of which there was one at $3\frac{3}{4}$ inches, calibre 34, one at 2 inches, 35, and another at $1\frac{1}{2}$ inches contracted to 34, cutting them all to 36.

May 29th. All bleeding having ceased upon the passage of the sound, I operated to close the fistula, which was successfully done over a 36 sound.

An examination on the 18th inst., gave passage to a 36 sound, without obstruction. No prostatic enlargement.

The forty-five cases tabulated comprise less than one-half of those I have operated upon in private and hospital practice. My record shows over 100 cases, but many are now under treatment, and others have passed so far beyond my observation, that I have not included them in this statement; but I may say, that I am yet to meet with the patient who complains of results attained, while to the medical gentlemen who have observed some of these cases to their conclusion, it has brought convincing proof that we have entered upon a new era in urethral surgery; that the opprobrium may be removed of pronouncing a patient cured of a disagreeable malady, and yet dooming him to the constant use of an instrument, always more or less painful, and often dangerous in its employment.

There has been a remarkable immunity from accidents. In but one case have I seen urethral fever; in but two severe hæmorrhage; in but two cases have anæsthetics been used; in but two cases have the patients been confined to their rooms beyond one day, and, on the whole, I am confident that accidents occur less frequently by this method than even by gradual dilatation. There is good reason for this. Nearly all, in fact all the authorities state, that Strictures more frequently occur near the bulbo-membranous portion, and, consequently, sounds are passed the whole length of the urethral canal, whereas my statistics show that but a small proportion of Strictures occur in this vicinity, and when those anterior to the bulb are divided thoroughly, those in the bulbo-membranous portion are found to have been spasmodic.

Another fact—all but five of my cases have a history of gonorrhœa, many of them mild cases, yet they left their mark on the delicate tissues leading to the bladder, and finally developed into dangerous maladies.

I will close my paper by calling attention to a few facts elicited by my tabulated record:

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Normal Urethral Calibre.

	No. of Times.		No. of Times.
32 mm. in circumference	8	38 mm. in circumference	1
33 " "	5	40 " "	4
34 " "	15		
35 " "	4	Total	45
36 " "	10		

Locality of Strictures.

First quarter inch	26	4¼–5¼ in.	7
¼–1¼ in.	18	5¼–6¼ in.	2
1¼–2¼ in.	25	6¼–7¼ in.	7
2¼–3¼ in.	37		
3¼–4¼ in.	21	Total	143

Cures reëxamined; no recontraction	24
Cures—Patient perfectly well when last heard from; no reëxamination	14
Perfect relief for a length of time, return of symptoms; reëxaminations; Stricture recontracted	1
Relief of most symptoms; some remaining; patient still under treatment	5
Partial relief	1
Total	45

Date of reëxamination. Cures reëxamined. No recontractions.

One month	1
Two months	1
Four months	1
Six months	4
Eight months	1
Nine months	2
One year	8
One and one-quarter years	2
One and one-half years	3
Two years	1
Total	24

The practical value of Prof. Pease's experience as shown in the foregoing 45 Tabulated Cases of Urethral Stricture, appears to me to be very great. All were operated on by the method of Dilating Urethrotomy, and in exact conformity with the plans and requirements which have been described and enforced in the previous pages of this volume. Prof. Pease had received no individual instruction from me in regard to the operative measures. Our only personal association at that time consisted in three or four consultations in special cases. Beyond this his only opportunities for becoming familiar with my views, experience, and modes of procedure, were through my contributions to the various medical journals, to which the entire profession equally had access. Prof. Pease brought to the subject a ripe surgical experience; an earnest and generous spirit; and a willingness to test fairly the truth or falsity of statements in regard to vital points in genito-urinary surgery which I had made with such positiveness that they became simple questions of veracity. The results of the independent experience of Prof. Pease, thus acquired, is shown to have been productive of success, even better than I have ever claimed, and to have confirmed every statement of mine in the minutest particulars. Located in an interior city where the persons operated on were residents, many of whom had also been under his personal observation and treatment by old methods, for a long time previous to operation, his facilities for learning the antecedents of cases, and for making re-examinations were superior to mine, and he has been thus able to confirm, in the most positive manner, my claims as to the *radical cure of Urethral Stricture.*

In evidence of increasing interest in the subject, since the reading of his paper before the State Medical Society, in 1877, I am able to state that in May, 1878, during a transient stay in Vienna, Prof. Pease gave demonstrations of my views, and of the capacity and uses of my instruments, and that, during the same month, he operated by Dilating Urethrotomy, with success, in the Clinique of Prof. M. Verneuil, of Paris.

F. N. O.

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STATISTICAL TABLES OF FORTY-FIVE CASES OF URETHRAL STRICTURE TREATED BY INTERNAL URETHROTOMY.

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.
1	27	Gonorrhœa in 1870, '72, '73. First attack 5 years previous.	1	Meatus.	22	34	Gleet	Gleet	2	.....	Cure	One year after. Perfect relief.
2	26	Gonorrhœa 1866, 9 years previous.	3	1 Meat. 2 1¾ in. 3 2¼ in.	24 29 30	35	Desire to frequently urinate, rising two or three times nightly. Slight gleet.	Gleet ...	2	.....	Complete cure	2 years after. No change.
3	34	Had gonorrhœa once when nineteen. Had been an onanist, had also been addicted to excessive venery.	5	1 Meat. 2 2½ in. 3 3 in. 4 3¾ in. 5 Membranous portion.	19 24 34 34 34	36	Involuntary discharge of water. Complete loss of virility, having had no erection for nearly a year.*	Enlarged prostate. Partial paralysis of neck of bladder.	3	.....	Entire removal of stricture, restoration of virility, constant improvement in tone of bladder.	March, 1877. Cure complete. Seen also by Doctor Otis's assistant. April 1st, 1880, not a trace of stricture.
4	29	Two attacks gonorrhœa. First, 13 yrs. previous, the second 11.	4	1 2½ in. 2 3½ in. 3 3½ in. 4 6½ in.	30 29 24 32	33	Gleet. At times mucopurulent discharge.	Gleet.....	2	.....	Cure	.....

* Additional treatment in Number 3: Galvanism to neck of bladder.

5	22	Had gonorrhœa twice. First attack two years previous, last attack just before operation.	2	1 ½ in. 2 3½ in.	24 30	34	Gleet	Gleet. ...	1	.....	Cure	18 months after. Cure permanent.
6	41	Gonorrhœa 3 times. First, 16 years before operation. Second and third, respectively, 9 and 5 years ago.	4	1 Meat. 2 2½ in. 3 4¾ in. 4 7 in.	19 25 22 24	40	During five years previous to operation, there was a constant gleety discharge. Urine passed "stillicidium," loaded with mucus. Is lame. Strength impaired. General condition very much reduced. Meatus passed No. 19, but 3 inches posterior to this nothing but a filiform bougie can pass.†	Gleet..... Cystitis.	3	.....	Constant improvement. Three months after operation left, although greatly improved, not entirely cured.	Have not seen him since, and hence cannot state present condition.
7	43	Had gonorrhœa. First attack 23 yrs. previous, the second when 22 yrs. of age.	4	1 Meat. 2 1½ in. 3 2½ in. 4 3½ in.	26 29 31 32	34	Difficulty in micturition, Frequent desire to urinate.	....	1	.....	Cured	Since died of cancer of stomach.
8	32	Gonorrhœa five years before examination.	5	1 Meat. 2 2 in. 3 3½ in. 4 4½ in. 5 5½ in.	24 22 14 19 19	32	Frequent retention of urine. Gleet constant and persistent.	Gleet.....	3	.....	Greatly improved, but treatment interrupted by attack of typhoid fever. Symptoms all relieved.	.....

† In case 6: At first urethra was so strictured as not to admit the urethrametre, consequently, although there were many other strictures they were never accurately defined. A filiform bougie was passed, and over it a 'Gouley's Dilator.' By this means a 11 E. was introduced as preliminary to the final operation.

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Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.
9	34	Had gonorrhœa fifteen years before, also eight.	4	1 Meat. 2 2⅔ in. 3 3½ in. 4 6½ in.	22 22 19 22	34	At times retention of urine. Gleet.	Gleet	1	.....	Believe him to be cured, although he has not reported since discharged.	.....
10	37	Gonorrhœa. First attack 15 years previous, second attack a few months before.	1	Meatus.	26	36	Suffering from gleety discharge since last attack.	Gleet ...	1	.....	Cured	Six months after operation. No recontraction.
11	32	First attack gonorrhœa 2 years before, last 1 year.	7	1 Meat. 2 1½ in. 3 2⅔ in. 4 2¾ in. 5 3½ in. 6 4½ in. 7 6½ in.	19 19 25 35 35 38 36	40	Gleet. Frequent calls to urinate at night. At times no control over bladder. Smarting sensations.	Gleet.....	4	.....	Every Stricture relieved except one at 6½ in. which now admits 38. Will operate again when patient, who is out of town, returns. Gleet, as also every other symptom, completely relieved.	.....
12	45	Gonorrhœa 23 yrs. ago, also 20 yrs. since, and probably 2 yrs. ago.	4	1 Meat. 2 2¾ in. 3 3⅜ in. 4 3¾ in	28 28 29 28	34	Interruption of stream in urinating. Tickling sensation in urethra.	Gleet.....	3	Growing out of 2d operation. there is a slight downward curvature of penis.	Cured	One year after operation. Completely cured. Curvature rapidly disappearing.
13	35	Gonorrhœa 16 yrs. previous, also 15.	4	1 Meat. 2 1½ in. 3 3 in. 4 6½ in.	16 19 25 25	36	Has had syphilis. Suffering intense pain in testicles.	Balanitis and phymosis, requiring an operation to relieve adhesion of the foreskin.	3	.....	Neuralgia of testicles greatly relieved.	One year, sixteen days after operation. Re-examination detects no Strictures.
14	38	Had gonorrhœa 8 years since, second attack 18 months ago, last time, 3 or 4 months since.	2	1 1 in. 2 4 in.	26 30	40	Has had gleety discharge for last two months.	Gleet.....	2	Very much hemorrhage, slight curvature.	Man of irregular habits, and treatment interrupted. However, being now treated. Gleet entirely ceased.	.....
15	35	Gonorrhœa one year before.	1	½ in.	29	34	Gleety discharge	Gleet.....	1	.....	Cure	9 months after. No return.

STATISTICAL TABLES OF FORTY-FIVE CASES OF URETHRAL STRICTURE TREATED BY INTERNAL URETHROTOMY.

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.
16	24	Gonorrhœa 3 years ago, second attack 2 years, last attack 3 mos. before operation.	3	1 ½ in. 2 2 in. 3 6½ in.	25 30 20	32	Frequent retention of urine. Persistent gleet. Had been treated for nearly 3 years by bougies.	Gleet	1	.....	Cure	One and a half years after. Cure perfect.
17	23	Had gonorrhœa in spring and fall of year previous.	1	Meatus.	24	36	Gleety discharge.....	Gleet ...	1	.....	Rapidly recovered.....	6 months after. Cure.
18	28	Gonorrhœa 7 years previous to examination. Also 5 years, and again contracted it nearly a year ago.	4	1 Meat. 2 ¼ in. 3 1⅓ in. 4 2½ in. Also several bands b'tween 1½ & 2½ inches.	22 24 29 29	32	Persistent gleety discharge.	Gleet.....	2	.....	Cure	One year after operation. No recontraction.
19	35	Gonorrhœa one year before operation.	1	⅛ in.	29	35	Gleety discharge, appearing and disappearing.	Orchitis .	1	.....	Cured	A little more than one year after. Cure permanent.
20	41	Gonorrhœa 11 years previous.	3	1 2¼ in. 2 3 in. 3 5 in.	22 22 35	36	For about five months had been pestered with frequent desire to urinate. Must rise at night.	.....	2	.....	Symptoms completely relieved.	One year after, when I find slight recontractions at 3 and 5 in. Not yet relieved.
21	47	Had gonorrhœa 30 yrs. before.	3	1 Meat. 2 1 in. 3 2¾ in.	19 21 24	34	Had been treated for last ten years with bougies.	.....	1	.....	Complete cure. Stricture apparently at membranous portion proved to be spasmodic.	6 months after. Cure perfect.
22	27	Gonorrhœa six years before, again 4, and lastly 1 or 2 years ago.	4	1 Meat. 2 ½ in. 3 2 in. 4 3 in	21 27 30 30	36	Has had gleety discharge since last attack gonorrhœa.	Gleet.....	2	.....	Cure	1¼ years after. Complete cure.
23	60	Gonorrhœa 40 years ago.	2	1 Meat. 2 2½ in.	19 32	34	Has for some years been troubled both in passing and with retention of urine. Had been treated for cystitis and enlarged prostate.	Phymosis which was relieved prior to operation for stricture.	2	.....	Cured	Nine mos. after. Cured.

STATISTICAL TABLES OF FORTY-FIVE CASES OF URETHRAL STRICTURE TREATED BY INTERNAL URETHROTOMY.

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.
24	38	Gonorrhœa 10 years previous, again 1 year before present examination.	6	1 Meat. 2 1¼ in. 3 1⅜ in. 4 2⅛ in. 5 2¼ in. 6 3 in.	22 28 26 27 28 32	34	Since last attack of gonorrhœa there has been a constant gleet. At that time examined him by old method and thought that I discovered a Stricture at bulbo-membranous portion, and another in the spongy. Was treated then with sound, and greatly relieved, but now returns, suffering from a renewal of the gleet.	Gleet	1	.....	Was cured, but has had gonorrhœa since, with either the formation of a new Stricture or recontraction of old one at 2⅛ in.	.....
25	33	Gonorrhœa 3 years ago. Again 1 year later.	4	1 ⅛ in. 2 1⅛ in. 3 2 in. 4 3 in.	19 22 22 28	36	Has had more or less gleety discharge since last gonorrhœal attack.	Gleet.....	1	.....	Cure	8 months after. Cure complete.
26	53	Had gonorrhœa 20 yrs. ago.	4	1 Meat. 2 1½ in. 3 2⅛ in. 4 3⅛ in.	20 21 25 28	34	Urethra very sensitive. Sense of constriction over hypogastric region. Frequent desire to micturate.	Diabetes.	2	Hemorrhage, patient being of a very hemorrhagic diathesis.	Cure of Stricture. Relief of diabetes; how much is due to Stricture I cannot say.	Since died of cirrhosis of the liver.
27	31	Gonorrhœa 11 yrs. previous. also 9 ys. since, and again 1 month before operation.	3	1 1¼ in. 2 2 in. 3 3 in.	25 27 30	35	Gleety discharge.....	Gleet.....	1	.....	Cure	One year and a quarter years after. No return.
28	19	Gonorrhœa one year before.	3	1 ¾ in. 2 2¼ in. 3 3 in.	25 25 25	32	Gleet	Gleet.....	1	.....	Cure	.....
29	25	Had gonorrhœa 8 years previous.	4	1 Meat. 2 2⅛ in. 3 2¾ in. 4 3⅛ in.	25 30 26 30	34	Has had an induration in left groin extending from lower part of the femoral ring to ant. sup. spinous process of ilium. Also has had a constant gleet since last attack gonorrhœa.	Eczema ..	1	.....	Cure	....
30	39	Gonorrhœa 16 years ago, several times since.	3	1 ¾ in. 2 2⅛ in. 3 5 in.	19 25 26	35	Persistent gleet. Frequently passing into muco-purulent discharge, resisting all medication and injections. Meatus contracted by syphilitic ulcer.	Syphilis ..	1	.....	All anterior to 5 inches, cured. This one recontracted. Will operate soon. Gleet cured.	....

STATISTICAL TABLES OF FORTY-FIVE CASES OF URETHRAL STRICTURE TREATED BY INTERNAL URETHROTOMY.

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.
31	40	Gonorrhœa 13 years before, again 1 year later, and finally, just prior to operation.	4	1 3 in. 2 2 in. 3 3 in. 4 5 in.	29 30 30 25	32	There has been a constant gleety discharge since first attack of gonorrhœa. Pain in calves of legs and back of thighs, and during urination in back part of forearm.	Gleet	2.	First operation followed by severe urethral fever & urethritis. Treated with rubber coil. 2d operation followed by no bad symptoms.	Recovery complete.	One year after. No return of symptoms or recontraction.
32	47	Congenital narrowing of meatus.	1	Meatus.	18	33	Feeling of titillation along urethra, believes it to be due to retention of a few drops of urine after micturition.	. .....	1	.....	Complete relief from every symptom.	Six mos. after. Recurrence of no bad symptoms.
33	22	Gonorrhœa 3 years previous.	2	1 Meat. 2 2½ in.	15 24	32	A recurring gleety discharge. There is a membranous bridge across the meatus, which in micturating produces a double stream.	Syphilis ..	1	.....	Cure	One year after. No return of any contraction or symptom.
34	27	Has had gonorrhœa three times: 7, 5 and 3 years respectively before examination.	4	1 Meat. 2 1 in 3 2½ in. 4 4 in.	19 19 22 26	32	Constantly recurring gleety discharge.	Syphilis ..	1	.....	Cure	Four months after. No change.
35	33	Gonorrhœa several times.	2	1 Meat. 2 1¾ in.	16 30	33	Gleety discharge.....	Gleet.....	2	.....	Cure	One year after. Cure permanent.
36	24	Gonorrhœa six years before.	3	1 ½ in. 2 1½ in. 3 2½ in.	20 30 30	32	Burning sensation in passing water; stream contracted; gleety discharge.	Gleet.....	2	.....	Cure	Three months after. Reveals complete cure.
37	23	Gonorrhœa mild attack 3 years ago.	4	1 Meat. 2 1¼ in. 3 2½ in 4 3¼ in.	18 25 29 31	33	Great difficulty in urinating and also some smarting. Gleet.	Gleet.....	2	.....	Cure	.....
38	35	Thirteen mos. since had gonorrhœa.	4	1 Meat. 2 ½ in. 3 2¾ in. 4 3½ in.	22 25 28 30	36	Gleety discharge. Had not subsided since attack gonorrhœa.	Gleet.....	1	.....	Still under treatment.	.....
39	26	Gonorrhœa several times.	1	1 in.	24	34	Persistent gleety discharge.	Gleet.....	1	.....	Gleet ceased.....	....

STATISTICAL TABLES OF FORTY-FIVE CASES OF URETHRAL STRICTURE TREATED BY INTERNAL URETHROTOMY.

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.
40	23	Never had gonorrhœa. Probably of traumatic origin.	3	1 2½ in. 2 3¼ in. 3 3 in.	34 34 35	36	Could not expel all of urine from urethra; what remained scalded him. Any indulgence in ale or stimulating food induced smarting. Meatus had been cut before seeing me.	.....	1	.....	Cured	....
41	48	Never had specific urethritis	2	1 Meat. 2 2⅝ in.	15 29	34	For ten or fifteen yrs. has suffered with constant desire to urinate. Find a membranous band extending over upper part of meatus, contracting its orifice by one-half.	.....	1	.....	Patient not ready for cutting posterior Stricture. Greatly relieved by first operation.	.....
42	60	Thirty years ago had gonorrhœa.	4	1 1½ in. 2 2 in 3 3¾ in. 4 4⅜ in.	34 35 34 35	36	Ten months before operation, had an attack of cystitis. Frequent desire to micturate. Albumen and casts in urine. Urethral hemorrhage; resulting in perforation of urethra and formation of fistula at 4⅜ inches.	Nephritis. Urethritis. Cystitis ..	1	.....	Operation to close fistulous opening made May 29, 1877, entirely successful. At present no albumen or casts in urine. Apparently a cure.	All present indications point to a perfect cure.
43	25	Gonorrhœa four times. Last attack in 1876.	4	1 ¾ in. 2 1¾ in. 3 2¾ in. 4 3½ in.	24 25 25 30	33	Incontinence of urine. Gleet. When first examined, contraction so close as to require dilatation several days prior to operation.	Gleet.....	1	.....	Still under treatment.	.....
44	43	Has had gonorrhœa several times within last 23 years.	3	1 1 in. 2 3¾ in. 3 4½ in.	29 32 35	38	Nine years before had an attack of paraplegia. Since this attack, has had paralysis of neck of bladder requiring the daily use of the catheter.	.....	1	.....	Begins to pass urine slightly without catheter. Considerably improved.	....
45	49	Gonorrhœa. Last attack two years since.	3	1 ¾ in. 2 1¾ in. 3 3 in	32 35 36	40	Scalding sensation on passing urine. At times retention; must arise three times nightly.	.....	1	.....	Cure	....

CHAPTER XIV.

MEMOIR TO THE FRENCH ACADEMY.

IN July 1877, through the courtesy of M. Verneuil, of Paris, a Memoir was sent by me to the National Academy of France, embodying, in a form as brief as was consistent with fairness, the views, experience and discussions which are given at length in the foregoing pages. The results of the further study and experience in the nature and treatment of urethral Strictures, from the date of my address to the New York State Medical Society, in February, 1865, up to May, 1877, were also added.

In order to place fully upon record in this country the views and statements contained in this Memoir, I have thought it best to reproduce them in this place, making such alterations and additions as are necessary to bring the subject in full up to this date, July, 1878.

My experience in the division of Strictures by the methods described, cover at this date (July, 1878), a period of nearly seven years, during which time I have operated by internal urethrotomy over six hundred times. In ninety-six cases at my clinique at the College of Physicians and Surgeons; fifty in my service at the Strangers, Charity and St. Elizabeth Hospitals, and the remainder in my private practice. One hundred of these cases comprising 203 operations, carefully tabulated from my private records by my then assistant, Dr. J. Fuhs, were reported to the New York State Medical Society in 1875, and appear on page 106, *et seq.*, of this volume. One hundred and thirty-six additional cases recently tabulated from the same source and in the same manner will be found at the close of this volume, making a

total of 236 tabulated cases which include the results of 373 operations on urethral Strictures. The total number which I have performed and recorded up to June 20, 1878, is 635.*

Thus far in operating with the dilating urethrotome (which was the instrument employed in every case, except when the Stricture was at the meatus), *I have not met with a single death resulting from, or attributable in any way to, the operation.* This statement will, I presume, be received with surprise by surgeons who are practically unfamiliar with the operation by means of the dilating urethrotome. It must, however, be borne in mind; 1. That, in the greater proportion of cases, the Stricture did not encroach upon the urethral calibre sufficiently to interfere markedly with the flow of urine, and hence were not complicated to any great extent by disease of the bladder or kidney; 2. That vastly the greater number were anterior to the bulbo-membranous junction; 3. *That the incisions were never made with a blade exceeding 2 mm. in breadth.*

Dilating urethrotomy in France is necessarily associated with the name of M. Reybard, who first recognized the necessity of complete division of Stricture as essential to radical cure. By M. Reybard's plan *deep* and *long* incisions were deemed essential, and the knife of his instrument measured nearly two *centimetres* on its cutting edge. Serious results after operation with this instrument were said to have been frequent. My dilating urethrotome, *the blade of which should never exceed 2 mm. in width*, was invented by me to meet special cases occurring in my practice. It was made and had been in use for nearly two years before I knew of the invention of M. Reybard. My first idea, and which has not yet been materially departed from up to the present time, was, by means of a dilating apparatus, to *fix* and *thin* the Stricture, so that a *slight* incision would suffice to sunder it. My plan has been *always to avoid deep incisions, and as far as practicable to avoid dividing healthy tis-*

* I have also operated upon quite a number of cases in the practice of other surgeons, the records of which are not included in this number.

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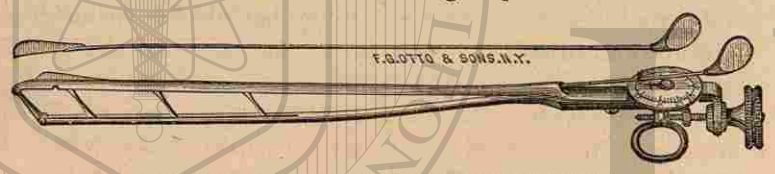
sues. To these facts and to the peculiar character of my operations I attribute my great immunity from surgical accidents. Between the years 1874 and 1876 I made various changes in minor points about my dilating urethrotome, with a view to increasing its ease of application, and the safety of its use. The chief alteration from the original was the attachment of a guard to the summit of the blade, in order, after the plan of M. Maisonneuve, to divide only stricture-tissue. After a time, however, it was found that slight and resilient Strictures often escaped complete division, and *always* unless the over-distension was very great. I therefore removed the guard and concealed the blade in a slit at the end of the shaft. I likewise had the instrument made straight and short, for more convenient use in the straight portion of the canal



THE AUTHOR'S STRAIGHT DILATING URETHROTOME.

where, fortunately, according to my observations, much the greater proportion of Strictures are to be found.

Heretofore all operations by internal urethrotomy have been performed as a last resort, after failure to obtain relief by other methods. It thus happens that a very large proportion of such cases have been the subject of advanced disease of the bladder and kidneys. The simple introduction of a sound or catheter where such organic disease is present has not unfrequently caused urethral fever, suppression of urine and death. It has therefore come to pass that the operation of internal urethrotomy, necessitated in these desperate cases, has been held responsible for fatal issues which were likely to result from any mode of interference. I am able to state with confidence, that complete division of all Strictures anterior to the bulbous urethra, (*i. e.* from five to six inches) by dilating urethrotomy properly performed, is one of the simplest and safest of all surgical operations; that in the very largest proportion of cases it is uncomplicated by a simple accompaniment which can be termed an accident, and that the recovery is, as a rule, practically complete in from three days to a fortnight after the operation—the variation depending upon the number, depth and calibre of the Strictures.

Even in cases of organic disease of the bladder and kidneys, division of Stricture in the ante-bulbous urethra, (strictly avoiding the passage of any instrument into the bladder) is less perilous than the passage of a catheter or sound through the deep urethra either for relieving a retention, or for purposes of dilatation.

I am able to state, still farther, that *the very great majority* of all supposed deep Strictures presenting for treatment *are anterior to the bulbous urethra.* In the 1st series, (one hundred tabulated cases,) Stricture was found beyond five inches from the urethral orifice, fourteen times (page 97). In the second series, 137 cases, only eleven times.

Prof. Brown (page 243) states that "*out of nearly* 100 *Strictures, including many that are usually considered impermeable at least* 75 *per cent. were found within the anterior* 4½ *inches.*"

Prof. Pease (page 262) shows that "*out of* 129 *Strictures but* 7 *were at or posterior to the bulbo-membranous junction.*"

It is greatly due to an appreciation of this fact, that operation in the deep urethra is so rarely necessary; this renders the risk of operation for by far the greatest number of urethral Strictures, comparatively insignificant.

This statement is eminently proved by my own experience

with not a death in over	635	consecutive	operations.
Dr. Mastin's experience p. 248 in	296	"	"
Prof. Brown's, page 237, over	300	"	"
Prof. Pease, p. 262 over	100	"	"

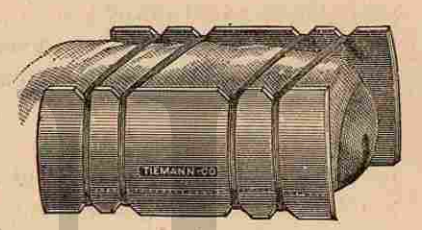
Thus making a grand total of 1331 operations, consecutively, without a single death or permanent disability of any sort.

While, however, it is true that very much the largest proportion of cases in which Strictures are divided by dilating urethrotomy are quite free from complications, yet from the

very nature of the structures involved it will be seen that care, judgment, and experience, are necessary in the procedure, to anticipate possible accidents. A certain amount of hæmorrhage of necessity occurs where vascular tissues are incised. This is so certain and so readily controlled, and so often ceasing spontaneously in a few moments, that it cannot be looked upon as an *accident*, unless in spite of the ordinary measures used to control it, an excessive quantity of blood is lost. In the summary of the 236 tabulated cases at pp. 106 and 324, it will be seen that this accident occurred only four times, and that in each instance the operation was in the deep urethra, always posterior to five inches. Inasmuch, however, as such cases are liable to occur in the practice of others, I shall present my entire experience in this accident, and also in the other accidents or complications which may be met in operations looking to the complete restoration of contracted urethræ in every part of their course.

1st. *Hæmorrhage.* This is likely to be most free where the Strictures divided are narrow and resilient. In these over distension to an unusual extent is occasionally required in order to divide the Stricture completely. The wound may thus extend well into the trabecular structure of the corpus spongiosum. In such cases, the hæmorrhage does not usually occur at once, but during a subsequent engorgement or partial erection of the penis, hence most commonly at night. To guard against this accident all patients should be required to remain in bed or on a lounge for a day or two subsequent to operations on the anterior portion of the urethra, say as far back as three inches from the meatus. In all cases where the operation is in the near vicinity of the bulb, or in the curved portion of the canal, the recumbent position should be insisted on for three or four days and a strict surveillance until all danger of hæmorrhage has passed, which I do not consider to be less than one week. When an attendant is not available a soft rubber tube one or two sizes smaller than the normal calibre of the canal, may be inserted and retained by a light bandage for one, two or three days, according to the necessities

in any given case. If the tube is not worn from the first it may be introduced to protect the surface of the wound during urination, for a day or two. In very sensitive persons, I have had the bladder habitually emptied by means of a small soft-rubber catheter. Contact of the urine with the fresh incisions, often painful, may be thus avoided, with the additional benefit of preventing the liability to urethral fever. The occurrence of urethral fever, however, rarely follows operations in the penile urethra. An admirable method of arresting hæmorrhage in the pendulous urethra and especially at or near the meatus urinarius has been devised by Dr. George K. Smith, Prof. of Genito-urinary diseases in the Long Island Hospital Medical College. This consists of pressure applied to the sides of the penis by two thin paste-board splints, an inch or so in width, padded with cotton,



PROF. SMITH'S COMPRESSOR.

and encircled, when in position, by half-a-dozen narrow India-rubber bands. Small notches in the splints keep the bands from slipping and the amount of pressure may be easily regulated by the number or size of the bands. I have never found it necessary to make enough pressure to give the patient any discomfort. Simple separation of the splints is sufficient to permit urination without removing them.

Hæmorrhage from division of Stricture in the deeper portions of the canal, from the difficulty in retaining a tube, or in making efficient external pressure, is sometimes embarrassing, especially so as the efforts to arrest it may cause the blood to be forced backward into the bladder. I have never failed to appreciate the liability to this complication whenever operating near the bulb or in the curved portion of the urethra, and have been so fortunate as to have met with but four cases in my own experience: three from internal urethrotomy, and one from combined internal urethrotomy and

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external perineal section. The first case was in 1874, in a patient, at the Roosevelt Hospital, who had a close Stricture extending quite to the prostatic urethra. A heavily guarded Maisonneuve blade 6 mm. in breadth was adapted to my first urethrotome and used in the expectation that nothing but Stricture tissue would be divided. The operation was followed by hæmorrhage into the surrounding urethral tissue and into the bladder, and was soon complicated with retention of urine. To relieve this, and to afford exit to the extravasated blood, and also to effectually command the point of hæmorrhage, I made the perineal section. The patient made a slow but complete recovery, and wrote me a year after that he had no return of his Stricture. This was the first and last use of so broad a blade. Two to three millimetres breadth have since been found sufficient for a guarded blade and two for a blade unguarded.

The second case occurred in February, 1877, after external perineal section for deep-seated Stricture, and internal dilating urethrotomy for several Strictures in the penile urethra. On the 12th day, the external wound having nearly healed, copious hæmorrhage from the deep urethra occurred several times, but was readily controlled by a few moments' pressure against the perineum, and by means of a finger in the rectum. Recurrence took place, however, frequently, and on the third day (*i. e.* the 15th after the operation) I was called in consultation, and found the bladder distended with blood nearly up to the umbilicus.

Introducing a No. 34 F. silver catheter, I emptied the bladder of nearly three pints of clotted blood and urine, and left the catheter in. No further hæmorrhage occurred, the catheter was retained, without great discomfort, for nearly three days, and beyond setting up profuse urethral discharge produced apparently no bad effects.

The third case occurred in June, 1877, where two very resilient Strictures of large calibre (defined by a 34 F. bulb in a urethra of 40 F.) were divided, at five and six inches from the meatus. The hæmorrhage came on about an hour after

the operation, during an attempt at urination. The patient was absolutely intolerant of a sound in his urethra, and resisted the introduction of ice into the rectum.

No external application of ice, nor any pressure with the finger or by compresses retained by bandages passing around the hips, nor the free internal use of matico could effect more than a temporary arrest of the hæmorrhage. This was quite free, alarmingly so at times, issuing externally with a gush, at intervals of several hours, and also oozing more or less steadily into the bladder. During the two days of its continuance the bladder was thrice emptied of clots which caused severe and persistent vesical tenesmus. By this time the patient was considerably exsanguinated, and it became evident that a fatal issue threatened unless the hæmorrhage was soon arrested. Preparations were then made for an external

PERINEAL CRUTCH.

perineal section, in order to gain direct access to the bleeding point, when the sight of an old crutch in the adjoining bath-room suggested a mode of relief which proved efficient. A folded towel was placed in the perineum, and to it the curved shoulder piece of the crutch was applied, bringing its other end down against the foot-board of the bed. The weight of the patient's body gave the desired counter pressure which he could regulate at will. Not the slightest oozing of blood occurred after this, and the patient made a prompt recovery. A board of proper length and width sufficiently padded would answer the same purpose in a similar case.

The fourth instance was in a man who had been operated on in Syracuse, by Prof. Pease, for close and dense Strictures at various points in the canal, from the meatus to the prostate. Re-contraction had occurred, and a second operation was done in one of the principal New York hospitals with like result. Through the invitation of the visiting surgeon in

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charge of the case, I was invited to do the third operation, in March, 1877. All the anterior Strictures were divided, raising the urethral calibre from a filiform size, to which the urethra had re-contracted, up to 36 F. The operation was commenced with the urethrotome of M. Maisonneuve and completed as far as the bulb with my straight dilating urethrotome. Two Strictures were ascertained to be present, at six and six and a half inches, of a calibre of 30 F. The danger of hæmorrhage from the division of these Strictures was fully recognized, but the crutch used in the previous case with so much success was relied upon to arrest it, and the deep Strictures divided to 36 F. Quite free bleeding followed and was thought to come chiefly from the anterior incisions. Pressure was made by a broad bandage around the penis, and the patient was taken from the operating room to his bed in the ward. An attempt was made to apply pressure in the perineum by means of the crutch but instead of a foot-board there was only an iron rod at the foot of the bed and so much delay ensued in arranging a resting place for the lower end of the crutch that the bladder became distended with blood nearly to the umbilicus, and solidly coagulated. Perineal section was considered but the man's pulse was good, and it was thought that the pressure of the distended bladder might act as a preventive of farther serious loss. An hour later my large 34 F. silver catheter was introduced and retained without trouble, for twenty-four hours, when a sharp urethral chill set in; this passed off, however, and the catheter was retained for 24 hours longer; when removed, some twenty ounces of clots were discharged from the bladder. The patient did perfectly well, and when re-examined by me about a month after, presented no trace of Stricture.

In order to prevent as far as possible the recurrence of embarrassment and trouble from lack of suitable appliances and their ready adaptation in cases of deep hæmorrhage, I contrived an apparatus which I have termed the *perineal tourniquet*. By reference to the accompanying cut it will be

seen that any desired amount of pressure may be brought to bear upon the perineal urethra by means of the thumb screw attached to the hard rubber perineal pad, counter-pressure being secured through the attachment of the perineal straps to a band around the body just above the hips. I have already had occasion to test the efficiency of this apparatus in a case, (the only one of the kind in my experience,) where a hæmorrhage came on ten days after the operation. It occurred in the daytime and immediately following urination, and about four ounces of blood were lost. The introduction of a rubber-tube stopped the hæmorrhage at once and completely, but as the deepest Stricture operated on was at about four inches, in order to leave the patient in security in charge of an attendant I applied the perineal tourniquet. Its action was simply perfect. Placing a folded napkin on the perineum, the apparatus was adjusted and pressure by means of the rubber pad was brought to bear upon the urethra at this point. A pressure, more than sufficient to cut off all possible communication between the bladder and the urethra as far as the membranous portion, was borne with comfort, and the degree of pressure was fully under the control of the patient by means of the thumb-screw which was within his easy reach. The security against danger from hæmorrhage which this apparatus is capable of affording, is apparently complete in all cases where the division of urethral tissues is not beyond the membranous urethra. It also prevents any hæmorrhage into the bladder from division of tissues anterior to this point, as might occur through pressure from any cause, anterior to the bleeding point. The tendency to hæmorrhage in all cases is greatly lessened by an application of cold water by means of cloths or, what is better, through the cold water coil.*

THE AUTHOR'S PERINEAL TOURNIQUET.

* Note.—Cold water coil, p. 104.

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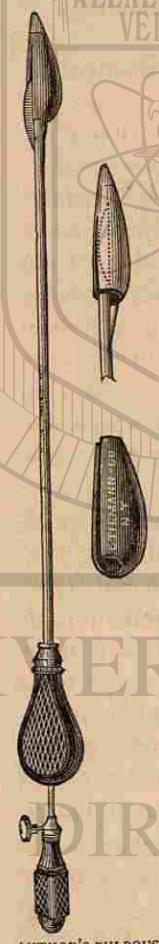
In the two cases of severe hæmorrhage, following internal division of Stricture in the deep urethra, the operation was done with my small straight urethrotome, with the curved probe-point attached to facilitate its passage beyond the triangular ligament.

CURVED-PROBE POINT.

While this urethrotome, according to my experience, is the most efficient for complete division of Strictures in all parts of the urethra, I have sometimes used the bulbous urethrotome first used in 1874, and presented to the profession in my pamphlet on "Instruments and Apparatus," May, 1875.



AUTHOR'S BULBOUS URETHROTOME.

This in shape is like the bulbous sound, so constructed that, after passage through a Stricture, a broad blade two to three mm. in breadth concealed in the bulb is drawn forward through the contracted point, by means of a handle which traverses the hollow shaft of the instrument. The blade is then pushed back through the Stricture into its place of concealment, and the instrument withdrawn. If the bulb has been of sufficient size to make firm resistance on attempted withdrawal *before*, and meets with none *after* incision, it is probable that the test by a bulbous sound of the size of the normal canal will show that the division has been complete. The bulbs of this urethrotome are readily changed, and range in size from 20 F. to 40 F.

For the division of narrow and dense Strictures in the deep urethra, this instrument is often efficient, but it lacks the certainty of action which characterizes the dilating urethrotome. Where, however, it is employed, the incisions are confined more completely to the cicatricial tissue, and, consequently, are less often followed by troublesome hæmorrhage.

A somewhat similar instrument, devised by Prof. S. W. Gross, of Philadelphia, and described in the second edition of "Gross on the Urinary Organs," 1875, is highly commended. My own experience is against the complete efficiency of the instrument in any but exceptional cases; at the same time, I would endorse it as safest in the division of deep Strictures, since it does less violence to the parts, and even is less likely to cause constitutional disturbance, while occasionally it effects a complete sundering of the Stricture.

I have been thus particular in considering the accident of hæmorrhage in connection with dilating urethrotomy, not because it is frequent, for it will be seen that only two grave cases have occurred from internal urethrotomy alone out of more than 600 operations (I exclude the Roosevelt Hospital case, as this was due to the error of too wide a blade, since corrected), and that in none was the hæmorrhage fatal. I am thus strenuous in calling attention to this matter because such an accident may occur in any case of division of deep Strictures and it therefore becomes important to manage every such case as if hæmorrhage were expected, and to have in readiness and be familiar with all the measures which are found efficacious in relieving anxiety and danger from this cause.

URETHRAL FEVER perhaps stands second in the order of accidents or annoyances occasionally following dilating urethrotomy. In 375 operations, tabulated on pages 98 and 317, it was noted in 18 cases. This condition, or epi-phenomenon, if it may be so called, is ushered in with a chill which lasts from a few minutes to an hour, and is followed by a rapid rise in temperature, sometimes to 105°. This continues for a few hours, when it declines rapidly, and is succeeded by a more or less copious perspiration. The return to a normal condition and temperature ensues in different cases in from 12 to 48 hours. In a word urethral fever is, in its symptoms and phases, the perfect analogue of periodic malarial fever, and is to be treated in the same manner.

I quite agree with Prof. Thomas R. Brown, in the state-

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ment in his interesting paper on Urethral Fever published in the N. Y. Med. Journal for Feb. 1878, that it is purely of reflex origin, and depends upon local irritation, and that when following upon a urethral operation is usually caused by the contact of the urine with the wounded surfaces. This is evident from the fact that the chill rarely comes on until after urination, although this may be delayed for 10 or 12 hours after the operation, and moreover, it may frequently be prevented entirely by drawing off the urine with a small soft rubber catheter, for two or three days. The fact, however, that the simple, easy and bloodless passage of a catheter may be, and not infrequently is, followed by an access of urethral fever, shows that any sort of irritation may induce it. I do not coincide in the opinion that "no condition of health appears to exempt from, or predispose to the attack." I should say that in persons of highly nervous temperament the predisposition to urethral fever is the rule, and any slight mechanical interference may give rise to it. Malarious antecedents increase in a marked degree the probability of its occurrence. The presence, likewise, of any disease, acute or chronic, of the deep urethra, prostate gland, bladder or kidneys, is a very great and unmistakable predisposing cause. I, therefore, hold that the previous recognition of any of these conditions is of the highest importance in the treatment of urethral Stricture by any method, and, further that, *in cases of long standing urethral trouble, and in all elderly persons, the passage of any instrument through the urethra into the bladder should never be attempted without a preliminary examination of the patient's urine to determine the state of the bladder and kidneys.*

The predisposition to urethral fever in persons as above described, suggests that all possible precautionary methods should be used to prevent this accident whenever, as is sometimes the case, surgical interference becomes imperative. To this end *rest* in the recumbent position for a day or two is of value. Hot sitz baths, temp., 110 for 3 or 4 minutes morning and night. Muriated tincture of iron and tonic doses of quinine in persons of debilitated habits. Immediately previous to the proposed operative procedure I am in the habit of administering five to ten grains of quinine (preferably 10) in pill or capsule, or instead of this, a suppository composed of ten grains of the bisulphate of quinine and a quarter of a grain of the acetate of morphine.* It is not from the fact that urethral fever in such cases is more likely to occur, and with possibly greater severity, than in healthy persons that this predisposition is important, but because when it does occur, the danger of the reflex irritation extending to the ureters and kidneys, and inducing a suppression of urine, is greatly increased, and that suppression so induced is frequently and rapidly fatal.

SUPPRESSION OF URINE is recorded in one case, as resulting from the combined operation of dilating urethrotomy and perineal section. Here it may be interesting to note that the operation was done in the face of the fact (ascertained by repeated examination of the urine) that the patient was suffering from Bright's disease of the kidney, as shown by the presence of hyaline and granular casts with albumen

* Opinions of authors, in regard to the value of quinine in averting urethral fever, are greatly at variance, some placing great reliance upon it, others again denying it the least possible influence. My own opinion is, that while this as well as any other known agent occasionally fails to prevent its accession, in the great majority of cases its favorable influence is demonstrable. I will cite a single instance. Mr. Y. was a sufferer from traumatic Stricture at six inches from the meatus. He had been under treatment by dilatation for several years, and stated to me that in every instance when dilatation was made by solid sounds or soft bougies, unless he took five grains of quinine at the same time, it was followed, within a few hours, by a severe chill sometimes lasting an hour or more, and succeeded by fever and sweating. That whenever he took quinine he invariably escaped. From that time until the present, some six years, he has been subjected by me to the periodical introduction of instruments, usually soft bougies. On about a dozen different occasions during this period he has forgotten to take the quinine, and each time, the dilatation has been followed by an attack of urethral fever. The dilatation in this case has usually been carried from 20 F. to 30 F. (in a penis of 3 in. circum.) during a period of ten days, instrumentation every other day. Then a period of about three months would be allowed to elapse, by which time recontraction to about 20 F. would take place and the same round of dilatation would require to be repeated. The nature of this patient's business, necessitating daily attendance, has, for this long period, prevented resort to the operation of dilating urethrotomy.

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in the urine; also that he had been confined to his bed with abscesses (caused by extravasation of urine behind Stricture) for nearly two years.*

The recovery was complete, re-examination 3 years later demonstrated the radical cure of the Strictures.

An occasional annoyance associated with the operation, and most liable to occur in patients of hypersensitive organization, especially subjects of prostatorrhœa or sexual irritability is from painful erections, coming on chiefly at night, and similar to those of acute gonorrhœa.

INCURVATION OF THE PENIS during erection is an occasional sequel, being caused by an inflammatory thickening along the superior surface of the urethra at the point of operation, where more or less discomfort may be experienced, as during erection this part becomes tense and salient.

In 4 cases out of 136 this condition persisted for several weeks, in one for about four months, finally disappearing without special treatment. In one case, after the incurvation had lasted a year, I succeeded in relieving the tension by operative measures. Taking advantage of the knowledge gained by M. Reybard in his experiments on dogs (*i. e.* that transverse sections of the urethral tissues resulted in Stricture, while longitudinal incisions were not open to that objection) I devised an instrument, or, rather, I modified my first dilating urethrotome (page 35) so that while distending and fixing the urethral tissues firmly, I might divide them in a *diagonal* line across the superior aspect of the canal. The accompanying cut will give an idea of the modified instrument. With this, I succeded in dividing the cord completely, giving immediate and perfect relief in

AUTHOR'S DILATING URETHROTOME FOR DIAGONAL DIVISION.

* In this case, after complete suppression for 24 hours, resisting treatment by cups over the loins, hot air baths, hot fomentation, etc., the secretion was apparently restored by the administration of 20 grains of calomel, in accordance with a suggestion in regard to such cases from Prof. Willard Parker.

one case (when the incurvation was so great as to prevent connection), and immediate though only partial relief to the other, which, however, was finally restored through absorption following the operation. It may be interesting to note here that the *diagonal incision* was not followed by Stricture.

In the four cases, where the incurvation persisted, the operation causing it, was done during the existence of high inflammatory action; in one case the acute stage of a gonorrhœa had been prolonged by the presence of Stricture, for more than four months. In two cases deeply seated Strictures had necessitated unusually deep incisions into the urethral and underlying tissues. Usually this result of inflammation gradually passes off after a few days, as in an ordinary gonorrhœal chordee. Occasionally, however, the plastic exudation thrown out becomes more firmly organized; several weeks may occur before the deposit is completely removed. In such cases it is common for the gleet to persist until the erections no longer occasion discomfort. The external application of a ten per cent solution of the oleate of mercury has seemed to hasten the disappearance of the plastic deposit. I have met with certain rare cases where the tendency to formation of inodular tissue, at points of injury, was excessive, resulting in overgrowth which, when occurring at the site of a urethral Stricture, has produced more or less permanent deformity where no operation (except dilating with bougies) has been performed.

SPONGIO-CORPORITIS.—In four cases I have seen a slight swelling and soreness at the point of operation apparently due to inflammatory swelling of the *corpus spongiosum* in the immediate vicinity of the wound. This I have ventured to call a *spongio-corporitis;* and while I have always felt some anxiety lest a localized abscess might result, the complication has passed off entirely within a few days, under the ordinary treatment used after all operations. Stilling, a German author of celebrity, in speaking of cases of urethrotomy by the old methods has observed something similar, and attributes it to the action of urine or pus or to a localized infiltration of

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urine in the tissues of the corpus spongiosum. Stilling's experience has evidently coincided with mine in regard to its temporary character. In his great work on Stricture of the Urethra (Cassel, 1870), page 1013, chapter on Rational Treatment, he says "infiltration of urine after urethrotomy can only occur if the flow of urine is prevented by coagulated blood or other causes. It is therefore of the greatest importance to remove any obstacle which might prevent the free escape of urine. This can easily be done, and if infiltration of urine should occur after internal urethrotomy, it is the surgeon's fault and not a necessary consequence of the operation. The same may be said of pus. The introduction of a catheter into the urethra prevents all these consequences, urine and pus escaping between it and the urethra."

If infiltration of urine has ever followed any operation by dilating urethrotomy with my instrument, it has only been of the limited degree producing a temporary and localized *spongio-corporitis* such as that just described. Bearing in mind however the very positive statements of Stilling as to the security against such accidents by keeping the urethra patent after operation, I have been in the habit of introducing a full sized sound daily for the first three or four days, and on the occurrence of any swelling, in addition to this to draw off the urine with a soft catheter, and wash out the urethra with a weak solution of carbolic acid until the swelling and tenderness have subsided. My own opinion in regard to the localized swelling is that it is caused by irritation of the parts in immediate locality of the incision by contact with acrid urine, and has been so rare, of so little discomfort and apparently of so little importance that I have not noticed it in the tabulation of cases.

CHAPTER XV.

STRICTURES OF LARGE CALIBRE.

IN this place I desire to call attention to the pernicious effects of Strictures but slightly invading the urethral lumen, and for the purpose shall relate a single typical case which is fresh in my experience.

Mr. A. D., aged sixty-four, came under my care complaining of a slight urethral discharge and a sense of irritation at the neck of the bladder. He had had no recent venereal contact, but had experienced several gonorrhœal attacks in early life. Examination showed a penis $3\frac{3}{4}$ inches in circumference, and a meatus urinarius of a capacity of 32 mm. Examination with the urethra-metre demonstrated a normal urethral calibre of 36 mm., and detected three narrow bands of Strictures at between two and three and a half inches from the meatus, each of the value of 6 mm. I advised immediate division of these comparatively insignificant Strictures, explaining and asserting my belief that the urethral discharge and the irritation referred to the neck of the bladder were a legitimate result of the holding and detention of gouty urine or its débris behind these barriers. Mr. D. declined any operative procedure with considerable warmth, and a palliative treatment (alkaline and diluent) addressed to his gouty diathesis was adopted. Improvement in the quality of the urine, which soon took place, caused a temporary relief from the irritation, and the discharge, which had never been profuse, gradually disappeared. The irritation returned, however, at the least indiscretion, and I was consulted about it every few weeks until February 2d, 1877, when he again presented, not only with return of the discharge and irritation at the neck

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of the bladder, but with pain in the glans penis and frequent painful urination. A small amount of pus was also found in the urine. Recognizing the fact that the urethral inflammation had extended to the bladder, I at once put Mr. D. to bed, and by posture, milk diet, local and general sedation, did what I could to afford relief. Notwithstanding this, a general cystitis supervened with great prostration, and came very near terminating his existence. He finally recovered (after some six weeks in bed), so that pus was no longer seen as a sediment in his urine, and urination occurred only once in six hours. Mr. D. was then sent to the seashore; there he improved in general condition up to June 2d, when he returned, complaining of a recurrence of old irritation and a gradually increasing frequency of micturition. This, as on former occasions, was preceded by, and now associated with, a slight, painless, purulent discharge. I advised a prompt division of the Strictures, claimed by me at the outset to be the cause of the urethral and vesical trouble, and now believed by me to be restoring the grave perils from which my patient had scarcely escaped. The gravity of any operative procedure in the face of threatened or advancing cystitis was fully appreciated. Professor Thos. M. Markoe (who previously had seen the patient with me during the height of the acute inflammation of the bladder) was called in consultation.

Notwithstanding the age of the patient (sixty-four), and his still somewhat feeble condition, resulting from previous disease, and the imminent threatening of another attack of acute cystitis, it appeared so evident that the return of trouble depended upon the presence of the Strictures that an immediate operation was decided upon.

In the presence and with the fullest approval of Professor Markoe, I divided the meatus from 32 mm., so that a bulbous sound of 38 mm. was freely admitted. No. 36 was then passed easily down 2½ inches, where it was arrested by the first Stricture. The (my) dilating urethrotome was then introduced so that when dilated its blade would rise just behind the posterior of the three Strictures previously measured and

located between 2½ and 3½ inches. The instrument was then turned up to 38 and the Strictures divided. No. 36 bulb was then passed easily through the entire canal to the bulbo-membranous junction, and, on withdrawal, demonstrated an entire freedom from Stricture. The urine was then drawn off with a soft catheter and six grains of quinine administered. The hæmorrhage following the operation was insignificant. A slight chill occurred about six hours afterwards, immediately following the act of urination; this apparently occasioned a rise in temperature of two degrees (101) for a few hours. Aside from this there was not the least constitutional disturbance and but slight pain on urination. Within twenty-four hours the intervals between the acts of urination had increased from two to three hours, and by the fourth day to six hours.

On the seventh day after the operation he was dressed and walking about, and claimed not to have been so wholly free from discomfort since his original irritation, more than a year previous. The intervals between acts of urination gradually increased. The urine became more and more free from pus without other treatment than that directed to general health, so that in a month he was apparently well in every respect; micturition once in five or six hours, and urine free from pus as a visible sediment. A few pus cells still found by microscopic examination.

October 7, 1877, Mr. D. called at my request for a reëxamination of his urethra. The urethra-metre was introduced, closed, to the bulbo-membranous junction, turned up to 36 F., and by gentle traction drawn through the length of the pendulous urethra without meeting with the slightest resistance, thus demonstrating the complete absence of Stricture, over three months from the date of operation, no instrument having been introduced in the interval. Recovery from the cystitis may be said to have been complete, although under the microscope a few pus cells are still found. There are also a few hyaline casts, but the case appears to me to prove fully the possible influence of Strictures of large calibre

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in producing urethral inflammation, which, extending by continuity of surface, may produce a cystitis, and even a nephritis.

In the foregoing case I feel confident that an early division of the Strictures would have cured the urethral inflammation by removing its cause, and that this would have prevented the cystitis in the first instance as surely as it subsequently did. The urethral discharge, which had been more or less profuse for the year previous, disappeared entirely a short time after the division of the Strictures, and has not been seen since.

Up to June 1878, this gentleman has remained well in every respect, not the least trace of pus or casts in the urine, and a critical examination of the urethra gave not the slightest evidence of re-contraction at the site of former Strictures.

URINARY INFILTRATION and perineal abscess not unfrequently occur as the result of Strictures which do not greatly impede the passage of urine, and through which an ordinary sound can be easily passed. The rupture of the urethra behind a Stricture, from urinary pressure, rarely if ever occurs. A urethral follicle constantly bathed in the irritating debris behind even a slight contraction, finally becomes involved in an inflammation of its deeper structure, suppuration follows, the urethral wall is penetrated and urine finds its way through the minute opening thus formed into the surrounding cellular tissue. Let me cite a case, which will serve to exemplify this statement in a striking manner.

Mr. Z., aged twenty-seven, a patient of the well known and accomplished surgeon, the late Dr. Julius Thebaud, was seen by me in consultation in February 1875, with the following history. Gonorrhœa twelve years previous, recurring gleet for four years, urethral Stricture recognized, treatment by steel sounds, size No. 24 passed with some pain. This was repeated at intervals of several days for a month; dilatation not well borne, pain and increase of discharge following. A few days previous some uneasiness in the perineum was complained of and a slight swelling was detected in that locality. Circumference of penis 34. Strictures defined, one at 2

and another at 3 inches, 24 F., one at 4 inches, 28 F. It was my opinion that a follicular ulceration had occurred behind the deepest and largest Stricture (size 28 F.); that in this manner the urethral wall had been perforated; and that extravasation of a limited amount of urine had taken place (an accident similar to that described by Dittel in Pitha and Billroth's Handbook of General and Special Surgery 3d vol., 2d div., 6th Book, page —.) In this case immediate external perineal section was imperative for security against possible sub-fascial extravasation. A general consultation was at once called, consisting of three more surgeons. After careful examination the presence of pus was considered probable, but doubts were expressed as to the origin of the abscess in the urethra. After a brief discussion it was decided to pursue a medium course by operating at once and thus to avoid the danger of a possible grave urinary infiltration, but to limit the incision to the peri-urethral tissues. The requisite operation was performed by Dr. Thebaud. A little bloody serum exuded from the engorged deep tissues, but no pus was found. The case went on for a week without much diminution of the swelling or of the aching in the testicles after urination, which had been a source of complaint previous to the operation. Another general consultation was called; consisting of the same gentlemen previously associated in the case. Before convening some 48 hours had elapsed, during which, without apparent cause, a favorable change had taken place; the swelling had begun to decline and the perineal wound presented a more healthy aspect. The improvement being fully recognized it was deemed best to avoid interference. At the end of a fortnight the perineal opening had healed completely when there was a sudden accession of discomfort and the swelling was found to have reappeared. The case was again seen by me in consultation with Dr. Thebaud and Dr. Reynolds (Dr. Thebaud's partner), some 48 hours after the discovery of the recurrent swelling. External perineal urethrotomy was again advised and promptly done by Dr. Thebaud and the Stricture at 4 inches (just anterior to the perineal incision) was

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divided with a blunt pointed bistoury. An ounce or so of pus and grumous blood was evacuated. Immediate relief of pain succeeded and the wound healed kindly and perfectly. The aching in the testicles previously spoken of as occurring after urination did not entirely disappear. This was attributed to the presence of the anterior Strictures at three and two inches from the meatus. These were thoroughly divided with the dilating urethrotome to 32 F., the previously ascertained normal calibre of the canal. A slight *spongio-corporitis* followed the operation, which delayed the progress of the case about a week; after which, recovery was steady and rapid, resulting in a complete cure of all trouble. A reëxamination three years after showed complete freedom from any trace of Stricture. This case appears to me to demonstrate the occurrence of urinary infiltration behind a slight Stricture, though in quantity so slight that a slowly forming abscess only resulted. The persistence of the trouble until the urethra was laid open, and the prompt recovery after that was effected, served to clear up any doubts that might have been entertained in regard to the urinary origin of trouble.

The case of Mr. X.,* detailed in my forthcoming volume on Reflex Irritations and Neuroses, may be referred to as one proving the follicular origin of a urinary infiltration of small but persistent character. In this instance an enormous swelling of the scrotum was caused by it, and persisted for five and a half years before it terminated in the series of abscesses through which the final character of the difficulty was ascertained. The statements of Dittel in Pitha's and Billroth's Handbook of General and Special Surgery, confirm in the fullest manner the foregoing views and cases. Thus in vol. iii, 2d div., 6th Book, "On Strictures of the Urethra" he says:

"A remarkable follicular ulceration of the urethral mucous membrane is found in some cases of infiltration of urine.

"The ulceration of the follicle is preceded by catarrh. The signs of catarrh are the threads washed out by the urine which escapes first. They are sometimes single, sometimes ring

* Originally published in the New York Medical Journal of Feb., 1875.

shaped or in masses, suspended in the urine. Though these threads are harmless, we must not forget, that the urethra is in a diseased state as long as these threads are found, and that this sequel of gonorrhœa, which is not unfrequent, may produce death by infiltration of urine and pyæmia, if the catarrh degenerates to a catarrhal ulceration of the follicles, even if only one follicle is involved.

"The following case is an instructive illustration. Count L. R., 59 years of age, had gonorrhœa repeatedly. An attack, from which he suffered 20 years ago, lasted nine months. Since then he had a burning sensation during micturition. March 5th, 1863, he suffered from occasional stinging pain at the perineum, which did not prevent him from continuing his former mode of life. On the next day, a red, somewhat tender diffuse swelling of the perineum, scrotum, skin of the penis and prepuce appeared, with moderate febrile reaction.

"March 13th he came under my care. The patient is a well developed and well nourished man. The scrotum forms a tumor of the size of a child's head, covered by a red, tender and tense skin which is connected anteriorly with the œdematous bloated up integument of the penis. The œdematous prepuce was phymotic in the highest degree. A bright redness extended even above the symphysis towards the anterior and lateral regions of the abdomen, which had become hard and tender. The patient is conscious, but is inclined to sleep. Skin, tongue, lips are dry. Great thirst. Pulse 96.

"Urine escapes in drops. Catheter No. 2 can be introduced, though with difficulty and some pressure, into the bladder, and meets an obstruction at the bulb. On the same day I made deep incisions into all swollen parts and used moderately cold applications, which did not prevent gangrene attacking the parts around the incisions. The pulse rose to 108. Tongue, pharynx, lips are as hard as a board. On the 16th a pretty large quantity of pus of urinous odor escaped from the wound; the redness extended up to the axillæ. There is fluctuation at a point above the symphysis. This was opened on the same day. Soon after he had a chill.

"On the 19th, after repeated rigors, he fell into a constant soporous condition. The integument is deeply yellow, the eyes have lost their lustre. The dryness of the mouth has increased wherever it was possible, the integument covering the abdomen is hard and bloated up, especially at the right iliac region. Thin and profuse purulent discharge from the

wounds; urine acid, containing chlorides, sulphates, albumen, and carbonate of ammonia, hyaline casts, renal epithelium.

"Patient died March 21st.

"At the bulbous portion of the urethra there is a Stricture, thin and callous, which extends to the membranous portion, and admits catheter No. 2. At the middle of the inferior wall of the urethra there is a perfectly round opening as large as the head of a pin, surrounded by a round and smooth margin which evidently corresponds to the mouth of a mucous follicle. If a thin sound is passed into this opening, we come to a very narrow passage in the spongy tissue, and ultimately reach the cavity of a large abscess in the subcutaneous connective tissue. From this point the infiltrated and gangrenous tissues extended in all directions.

"Every competent anatomist, after seeing this specimen, had a decided impression, that the infiltration was caused by the perforation of a single follicle. In this case, the mucous membrane is healthy, neither gangrenous nor softened all around the follicle. Only the ulceration of a single follicle caused the infiltration terminating in death.

"It is obvious, that even without the existence of Stricture the ulceration of one or several follicles may progress to perforation. I remember a young man twenty-five years of age, who had a bridle as thick as a knitting needle (after a gonorrhœa) which, running obliquely forwards from the fossa navicularis, terminated at the inferior wall of the urethra, leaving an opening as large as the point of a needle through which urine escaped.*

"The ulceration may be confined to one follicle or may extend over an entire group of follicles which occurs, as we know from experience, most frequently at the bulb.

"If perforation occurs in a group of follicles there appears a larger inflammatory swelling (accompanied by pretty intense phenomena) in which the various follicular perforations unite, to confluate in one abscess, or which may cause infiltration of urine before an abscess could be formed.

"From one follicle one passage only may be produced, or several channels may result. The same is the case if perforations occur in several follicles."

It is interesting to note the fact that Dittel in his preface to the recital of the foregoing cases very distinctly

* Since that time I have had three patients with perforating follicular ulcerations at the bulb after blennorrhœa without Stricture.

recognizes the connection between the perforating follicular ulceration and a urethral catarrh which is associated with "*threads of mucus sometimes single, sometimes ring-shaped, which are washed out of the urethra by the urine.*" "Though these are harmless," he says, "we must not forget that the urethra is in a diseased state as long as these threads are found and that this sequel of gonorrhœa, which is not infrequent, may produce death by infiltration of urine and pyæmia if the catarrh degenerates into a catarrhal ulceration of the follicles, *even if only one follicle is involved.*" Since the efficient examination of the urethra behind a contracted meatus or a Stricture has been possible through the use of the urethra-metre, we now find that the threads of mucus referred to by Dittel "sometimes single, sometimes *ring-shaped*," are, *in all cases*, accumulations *behind urethral co-arctations—Strictures more or less salient, which keep up the gleet and hold behind them the threads of inspissated mucus and pus*, and, finally, in such cases as are referred to, induce a folliculitis with occasional results of the character so graphically described by Dittel.

REFLEX IRRITATIONS AND NEUROSES, resulting from slight Strictures: The importance of recognizing the earlier stages of urethral Stricture has not hitherto been conceded, and the statement of Mr. Berkeley Hill, if accepted as true, will render this obvious. He says, (see page 216) "If the balance between the natural expulsive force of the bladder and the friction of the stream along the urethra is disturbed, the bladder is irritated, the kidneys are affected, and the beginning of the long chain of events which terminates not infrequently in death is made." It is true that in many cases no apparent trouble is experienced until the calibre of the urethra is infringed upon to the extent of interfering with micturition, and yet in other cases, slight Strictures, reducing the urethral calibre not more than three or four millimetres in circumference, are capable of producing frequent micturition, inflammation of the bladder, and various neuralgic disturbances. Deep organic urethral Stricture is often simulated

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by muscular spasm the result of irritation caused by slight anterior Strictures, even by a slight contraction of the meatus urinarius alone. *The great proportion of cases treated by gradual dilatation are treated for deep Stricture which does not exist.* The presence of a contracted meatus urinarius or a Stricture of large calibre, often unnoticed, is capable of exciting chronic spasmodic closure of the membranous urethra quite undistinguishable from true organic Stricture, but which disappears completely on the thorough division of the anterior contraction. A large number of cases of this character may be found described in my volume on "*Reflex Irritations and Neuroses throughout the Genito-urinary Tract*," soon to be published by Putnam's Sons. In some of these cases, frequent retentions of urine are proved to have been the consequence of a contracted meatus which would easily admit what has been considered a large or full sized sound. Two of these cases,* are so significant and suggestive that I shall take the liberty of quoting them in full.

Case 1. J. W., frontiersman, aged 45, presented November, 1874, with a history of first gonorrhœa 20 years previously and several subsequent attacks. Five years ago began to have difficulty in passing his urine; stream grew gradually smaller, until, after a debauch, he had complete retention, and was obliged to seek relief at a neighboring military post. After 36 hours suffering, he was relieved by the passage of a very small, flexible catheter, in the hands of the post surgeon. After this he submitted to treatment, by gradual dilatation, for several months. He then learned to pass No. 12 English soft bougie. From neglect, he has had some half a dozen attacks of retention during the past year. At last only the smallest instrument could be passed by the military surgeon, and he was advised to go East and have a radical operation performed, as there were no instruments at the post suitable to operate upon so small a Stricture. His habit for a long time has been to pass his water very frequently during

* Extracted from Reflex Irritations and Neuroses throughout the Genito-urinary Tract, by F. N. Otis, M. D. Putnam's Sons, New York, 1878.

A cursory glance over the two hundred and eighty one tabulated cases to be found at pages 264 and 324, will show the frequency of reflex irritations, more or less grave, connected with urethral Stricture.

the day, in a very fine, irregular stream, and several times during the night. Examination. Is of large stature, looking like a strong man, who had endured much exposure and hardship. Made his water in my presence, in fine, short jets, chiefly dribbling. Circumference of the penis, three and one-half inches; size of meatus, 23 F. No. 23 F. steel sound passed easily through a very sensitive urethra to the bulbo-membranous junction, where it was arrested. Gradually decreasing bougies were introduced, until, finally, No. 12 F. passed into the bladder, closely hugged in the deep urethra. Allowing it to remain for a few moments, I found it free. I then withdrew it, divided the contracted meatus and Stricture, extending for nearly half an inch back, and passed 34 F. solid steel sound slowly down to the bulbo-membranous junction, when it *slipped by its own weight into the bladder.* After the withdrawal of the sound the patient passed his water in a full large stream. From this moment he had no further trouble in urination, passing his water at intervals of six or eight hours during the day, and not at all at night, for the week subsequent to the operation, when he left for his home in the far West, apparently well in every respect.

Case 2. Mr. W., aged 27, had first gonorrhœa four years previous, lasting in acute form for one month, and with painless discharge for six months longer. He had frequent returns of the discharge without fresh exposure; had been under treatment for close, deep Stricture for the past year, by several surgeons. Passed his urine in a small irregular stream, once in two or three hours. His last surgical attendant, after two months' treatment by injections and internal remedies, sent him to me, not being able at any time to pass an instrument into the bladder. Examination showed external organs large, meatus contracted to 24 F., red and pouting, and bathed in a profuse muco-purulent discharge. Twenty-four F. sound is arrested at five inches. Only fine filiform will pass, and that is closely hugged. Three days after, pass filiform with ease and follow with No. 10 F.; then, with some effort, with No. 16 F. After this the filiform was again snugly held in the membranous urethra. I divided the Stricture at the meatus freely, and introduced No. 30 F. steel sound, which passed, literally by its own weight, through into the bladder.

The results of my earlier observation on the influence of slight contraction of the urethra in producing various forms of reflex troubles were first published in Dr. Brown-Sequard's Archives of Medicine in 1873. Since that date I have in published cases and in reports to societies claimed a credit for originality in the

Among the 136 cases which may be found tabulated at the end of this volume, Strictures beyond 5 inches from the meatus occurred in only five. In 136 cases (see page 317) it is shown that of *Strictures of the meatus alone*, eleven had been under a prolonged treatment by dilatation for deep *urethral Stricture*, and seven of these were cured by simply dividing

discovery of a direct influence exerted by slight urethral contraction in producing varied and grave disturbances throughout the genito-urinary tract, even in certain cases extending to distant parts of the entire economy. Within a few weeks, however, (May 1878) a careful search through the published writings of M. Civiale of Paris, (made at my suggestion by my accomplished friend, Dr. M. J. De Rosset, of New York,) I have found my claims to priority in this matter to have been without foundation. Now while I claim my own published views and observations prior to this date to have been original with myself, I hasten to concede the honor of priority in this field, to the distinguished French surgeon to whom it fairly belongs. The following quotations are from M. Civiale's *Traité Pratique des Maladies Génito-urinaires*, 2d edition, 1850.

At page 45, et seq., of his work, M. Civiale writes thus: "*Independent of its local sensitiveness the urethra possesses another kind which may be termed sympathetic.* * * * *When this sensitiveness is aggravated it may awaken sympathetic response in every organ and function of the body.* * In many cases the sympathetic (reflex) phenomena were manifest in the lower extremities, particularly in the soles of the feet. Again, at page 354, et se , "It is not rare to observe that slight encroachments upon the urethral calibre induce marked difficulty in micturition, those at the meatus having this effect not less than those located farther in."

Again at page 160, "Strictures seldom exist for a long time without exciting a series of disorders of the genito-urinary functions and, consecutively, in remote parts of the body, * * * among these, gleet, retention of urine, difficult micturition, catarrh, swelling and induration of the penis.* * * That which has struck me forcibly in dividing a meatus often only slightly contracted, is the sudden and complete change effected in the general condition of the patient. The constriction which seemed hardly to impede the flow of urine is no sooner divided than all morbid symptoms vanish; *the urethral walls, which were rigid, hard and inelastic, immediately recover their normal condition;* the bougie which at first passed only with difficulty and pain, slips into the bladder with ease, and in five or six days the slight incision in the meatus heals perfectly, and the patient finds himself in a state so satisfactory that it would be incredible but for the fact that the instances are again and again repeated. An effect so prompt, through means of which the significance is plain, shows that *the slightest obstruction in the urethra is able to produce the gravest symptoms, local and general.*"

Why the important teachings contained in these writings have, until now, been literally *ignored* in the medical literature of the English language, I leave it for the various English speaking authors of subsequent works on genito-urinary diseases and affections of the nervous system to explain.

the meatus. A still greater number were only treated for deep Stricture, exclusively, when careful and conclusive explorations showed them to be present only in the anterior portion of the canal.

It may now be claimed that any treatment of urethral Stricture that is not based upon a knowledge of the locality and extent of the Stricture is thoroughly empirical, and, while often mischievous, is never better than palliative in its results.

One of the grave objections to gradual dilatation is, that in order to be sure to reach all the possible points of Stricture, it must be carried *throughout the entire course of the urethra and into the bladder.* In the absence of exact information as to the locality and extent of the contractions the judgment is formed from its effect on micturition, the fallacy of which is strikingly illustrated in the cases just cited.

Urethral narrowings, or obstructions, are not considered by dilationists of any importance until they begin to interfere with urination, which often, in cases of true Stricture, does not occur until the foundation of fatal disease of the bladder or kidneys has been laid. The lack of exact knowledge implies not only a necessity for treatment of the entire urethra for trouble limited perhaps to some one small point, but gives the general impression that all cases of Stricture are much the same in point of gravity, so that operative procedure, (beyond the palliative use of bougies and sounds,) is discouraged until the life of the patient is imperilled, it may be by an obstinate retention of urine, or by an extravasation of urine into the perineum. This latter accident not rarely takes place behind Strictures of large size, the urine burrowing through the urethral walls, resulting in perineal or scrotal fistulæ, and possibly in fatal extravasation of urine into the general subfascial cellular tissues, as shown at pages 296, *et seq.* This loose and unscientific treatment of Stricture leaves the patient in complete ignorance of his peril from the early inception of his trouble until his life is endangered, when any operation looking to radical relief is approached under the most unfavorable circumstances. The results of such operations, if unfavorable,

are made to discredit all operations, and are scored as an argument in favor of gradual dilatation, when, in point of fact, the insidious and fatal peril has been nursed and encouraged, from its inception to its culmination, by the treatment which was carried on in ignorance of the extent or exact locality of the Strictures.

CHAPTER XVI.

STRICTURES OF SMALL CALIBRE.

IN every other disease or difficulty it is considered the duty of the surgeon as far as possible to recognize the approach of danger, and to attack the trouble in its inception. Urethral Stricture, however, appears hitherto to have been the exception to this rule. The causes of Stricture have long been appreciated. It is known to result upon an inflammatory process usually of gonorrhœal origin. So frequently does Stricture to a greater or less extent follow an attack of gonorrhœa that it is the rule rather than the exception, and yet, it is common for persons, the known subjects of repeated attacks of gonorrhœa, to suffer from what are termed obscure troubles of the genito-urinary organs, such as recurring orchitis, recurring cystitis, supra pubic, and sciatic neuroses, gleet, frequent micturition, etc.

These troubles may and do exist under the very eye of the surgeon, without any attempt having been made to test intelligently the presence or absence of urethral Stricture. It may then be broadly stated, that while urethral Stricture is the result of inflammatory action from various causes, close urethral Stricture, as a rule to which there are few exceptions, is the result of neglect to discover and treat this disease in its early stages, during which, with the means at present within the reach of every surgeon, it may be promptly cured with but little inconvenience and still less risk to the patient.

"*Chronic urethral discharge, commonly called gleet, is the signal which nature hangs out to notify the intelligent surgeon that an obstruction to the normal working of the muscular apparatus of the urethra has occurred, and that Stricture has been*

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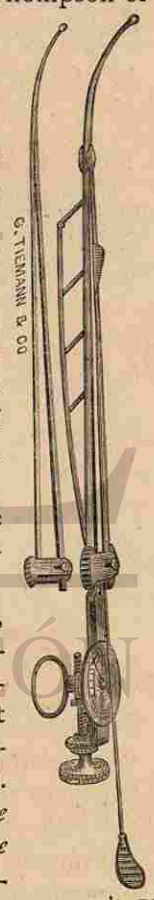
initiated at some point in the course of the urethral canal. Plastic material laid down in the antecedent inflammatory condition has begun to contract the normal urethral calibre, whether it be 20 or 40 millimetres in circumference. Sandal oil may stop the gleet for a time; injections of innumerable variety may, any one of them, temporarily remove it, but a little vinous or venereal excess will reproduce it, and thus the case goes on, getting, as many so afflicted will affirm, a new clap for every woman they look at, until finally an attack of retention of urine calls attention to the fact that the patient has a strictured urethra" (*page* 75).

Strictures of small calibre are thus initiated, pursuing their course implacably from their inception, to their culmination in greater or less embarrassment to the passage of urine. During this period, it has been intimated that a recurring gleet is the early result of the strictured condition; perhaps the earliest. In many instances this is the only *outward* sign of mischief; but habitual interruption to the flow of urine not unfrequently produces irritation of the bladder and kidneys, which, long neglected, constitutes the gravest peril in any attempted measures of relief. Hence in all Strictures of small calibre it becomes necessary to make a careful examination of the urine in order to ascertain to what extent the bladder and kidneys have participated in the damage caused by the Stricture in order to guard against avoidable perils in treatment. (See p. 287, et seq. on urethral fever.)

The division I have been accustomed to make between Strictures of large calibre and Strictures of small calibre is based upon their size in relation to my dilating urethrotomes which, as at present constructed, have a circumference of 18 to 20 millimetres. All at or above that measurement are included in the class of Strictures of Large Calibre, and may be the subject of immediate operation by dilating urethrotomy. All ranging below 18 millimetres down to a point of practical impermeability, fall into the class of Strictures of Small Calibre, necessitating the use of various methods of treatment in order to bring them up to a size which will permit the passage of the dilating urethrotome with a view to eventual radical cure.

When Strictures of small calibre are situated in the penile urethra, where the greatest proportion of all Strictures are found, there need be but little apprehension of danger from the use of immediate measures to bring them at once up to the size requisite for the passage of the dilating urethrotome. Divulsion may be made with the instrument of Thompson or Perreve, or with modifications of the latter by Holt, Voillemier and myself. Division by means of the urethrotome of M. Maisonneuve has, in my hands, often proved equally serviceable. In all cases, however, where there is no necessity for immediate operation, I have preferred to use gradual dilatation by means of the soft French bougies. In this way a larger surface of mucous membrane presents when the urethra is restored to its normal calibre by dilating urethrotomy. The especial advantage of this latter procedure has seemed to be a more rapid recovery from the associated gleet by the diminished amount of new mucous membrane necessary to supply the new surface which the restored canal has acquired. The treatment after dilating urethrotomy in these cases does not vary from that applicable to Strictures of large calibre.



AUTHOR'S DIVULSING URETHROTOME.

Strictures of small calibre in the deep urethra, that is, beyond the bulbous portion, are fortunately rare; those so frequently met in the ordinary treatment by dilatation being for the most part spasmodic and promptly relieved by the removal of anterior contractions, often but slight. *It is therefore the first and highest duty of the surgeon in all cases of suspected Stricture in the deep urethra, to ascertain and remove all anterior contractions.* After this is efficiently accomplished, and when, by healing, all irritation

from the wounds of operation has passed away, if then an obstruction remains which firmly engages or (if of sufficient size to allow its passage) firmly grasps a small instrument, it must be accepted as a true deep organic Stricture. Close organic Stricture* within or beyond the membranous urethra is always a matter for grave consideration on account of the frequency with which it is associated with disease of the bladder or kidneys, and hence the greater liability to constitutional and serious functional disturbance following operative procedure, *and this is not less in the aggregate where this procedure consists in the attempt at gradual dilatation.* Hæmorrhage too, is here much more liable to prove serious in any operation of internal urethrotomy than at any other point, from the difficulty with which it is controlled. For these reasons in all long standing cases of deep close organic Stricture I consider the operation of *external perineal section* preferable to internal urethrotomy by any plan. Free exit is thus made for the urine and the products of the operative procedure, and free access is secured to any bleeding point, while I feel quite certain that the dangers of suppression, pyelo-nephritis and pyæmia are not greater after the external section than after the internal. Except in cases of traumatic origin, deep urethral Strictures are always associated with Strictures more or less numerous and extensive in the anterior portion of the canal. Operation by external perineal section may here be supplemented by dilating urethrotomy for the anterior Strictures, and thus the entire urethra be restored at once to its original calibre without adding materially to the risks of operation. I have to record eighteen such cases operated on by me within the last eight years with but two deaths, as follows :—

Case I. Had numerous close Strictures of sixteen years duration complicated with chronic cystitis and pyelitis. Seen in consultation with me by Dr. Geo. A. Peters, who also rendered valued assistance during the operation. Deep

* See cases of spasmodic Stricture accompanied by frequent retentions of urine from contracted meatus urinarius, page 302.

Stricture divided by the external perineal section—and five anterior Strictures by dilating urethrotomy. Complete healing of the wounds ; death on the sixteenth day from pyelo-nephritis and abscess of the kidney.

Case II. Broome St. Age fifty-eight. Old, close, very extensive and deep Strictures; frequent and painful retention complicated with Bright's disease of the kidney (albumen in urine, granular and hyaline casts) combined operation, dividing deep cartilaginous Strictures by the perineal section, and several anterior close Strictures by dilating urethrotomy. Suppression of urine second day after, relief on the fourth, death on the sixth from uremia—no autopsy.*

* Besides the above reported cases only two other deaths have occurred in any way associated with my practice from causes in any degree attributable to operations on the genito-urinary apparatus. One aged seventy-eight at Paterson, N. J., (whose history may be found in Otis on Reflex Irritations and Neuroses. Putnam's Sons, 1878.) Here long continued and painful disease of the bladder was relieved by dilating urethrotomy. Recontraction and a more extensive division of Strictures resulted in relief a second time. A week after this operation, a catheter was left in the bladder for forty-eight hours by the family attendant. A chill with suppression of urine followed and subsequently death by uremia: distinctly not from the cutting operation, over a week previous, but from the urethral irritation caused by a prolonged retention of the catheter for relief of frequent troublesome micturition. This was found on post-mortem examination to have been due to a small phosphatic calculus which had escaped detection during life. The second case, a man of forty or thereabouts suffering from close, chronic, deep Stricture, came under my observation during a recent visit to Syracuse. Repeated efforts by several surgeons during a long period had failed to pass any instrument into the bladder. The case had become urgent on account of retentions and severe suffering. Etherization was effected with great difficulty. Spasmodic tremor of limbs continued after profound anæsthesia, so that there was much embarrassment in the introduction of instruments. After waiting and careful trial, at the end of an hour and a half I succeeded in introducing a Maisonneuve staff well into the bladder. This was followed by a medium-sized blade, subsequent to the withdrawal of which, a gum elastic catheter was introduced and the urine drawn off. The case was left in charge of the two surgeons previously in attendance. About a month later I learned that the patient had died on the third day after the operation, in a comatose condition, after having taken largely of morphine and chloral to control nervousness and pain. *There was no suppression of urine.* No autopsy was made.

I have been thus circumstantial in presenting the record of deaths in any way implicated with operative procedures at my hands, because it has been stated, by at least one prominent surgeon in this country, that all the deaths occurring from urethrotomy in my practice had not been reported, and I have also had an

It sometimes happens that Strictures both in the penile and in the deep urethra are met with which are *practically impermeable*, that is to say, in which, from the tortuous course of the urethral canal at the seat of Stricture, or from a lack of instruments of sufficient tenuity or flexibility, either or both, no permeability can be demonstrated such as will permit the introduction of means through which the bladder may be emptied or the division or divulsion of the Stricture can be accomplished. In this sense Strictures may be permeable to-day and impermeable to-morrow. There are, I think, few surgeons who have not demonstrated the patency of a Stricture by the easy introduction of a filiform bougie, and, in a day or two after, when preparing to operate by internal rupture or division, have not found the filiform guide refuse to pass the Stricture, and even under complete anæsthesia, neither be coaxed nor compelled to lead the way for the shaft of the cutting or divulsing instrument. Under such circumstances no proper course is left but to allow the patient quietly to awake to the consciousness of a great disappointment, and to wait for a more favorable day.

Unfortunately, it is not always that such an operation can be postponed. For instance, in cases of Stricture where, in usual health, the urethra will admit a bougie of eight or ten millimetres in circumference; in any such, a sudden cold, an excess at table, or other comparatively slight cause, may bring about a retention of urine that will not yield to general measures; and, finally, when the agony of accumulation in the bladder has gone on to the last degree of endurance, should no immediate passage through the Stricture be effected, a resort to tapping above the pubis, or through the rectum, alone can save the sufferer from death. This great misfortune, and that lesser one, previously described, are often due, not to a want of skill, or intelligent effort, on the part of the

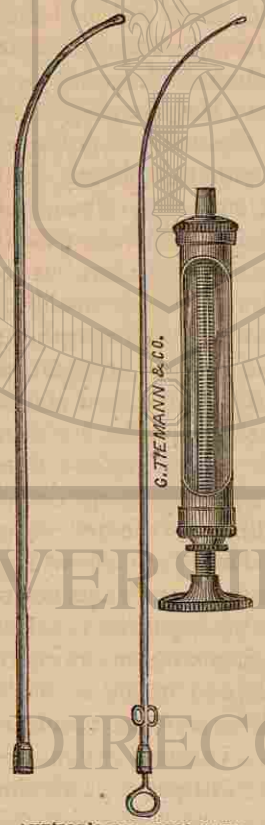
inquiry to the same effect made of me by several amiable friends. It is due to the operation of dilating urethrotomy, to humanity, to myself, that further misunderstanding in this matter should be prevented, and I will say in regard to it, still farther, that the foregoing statements cover a period of the sixteen years during which I have been a public teacher of diseases of the genito-urinary organs.

surgeon, but simply a lack of suitable instruments with which to afford relief.

The divulsing instruments of Thompson and Holt and the urethrotome of M. Maisonneuve are usually, any one of them, efficient in cases of close Stricture requiring immediate operation. Occasionally, however, the surgeon will fail in the most intelligent and patient efforts to pass them through the Stricture and into the bladder, without which no divulsing or internal cutting operation is justifiable.

Sir Henry Thompson's smallest divulsor has a circumference of 12 millimetres, Mr. Holt's 10, M. Maisonneuve's urethrotome 7 millimetres. Now, to make an operation possible by any one of these instruments its shaft must first pass certainly and entirely through the Stricture. For the purpose of facilitating and securing this passage, the filiform guide of M. Maisonneuve, of a somewhat smaller calibre, is attached to each by means of a delicate screw, the male thread of which is upon the extremity of the shaft, the female thread upon the filiform guide. This fine flexible bougie has but to be gently slipped along within the urethra, easily avoiding here and there the natural obstacles which oppose its passage; as these guides are manufactured as small as *three* millimetres in circumference, few, indeed, are the Strictures so close as to forbid their entrance through them into the bladder. Unfortunately, however, the smallest female screw, of either foreign or domestic manufacture, which can be relied on as of sufficient strength to attach the filiform to the operating shaft, is quite *seven millimetres in circumference*. After the passage of the filiform guide—say of four, five, or six millimetres in size—through the Stricture into the bladder, the next step in the operation is to screw on the operating shaft of whatever instrument it is decided best to employ. This now readily follows the guide until arrested at the point of Stricture *by the female screw of seven millimetres in circumference*. The filiform has easily passed the obstruction, and its distal extremity is coiled up in the bladder; but the shaft of the instrument will not readily follow. An important ques-

tion now arises: How much force may safely be used in advancing the shaft? and, further, how shall we determine the direction in which it may be exercised? Although the guide may be well in the bladder at the commencement of the operation, this is no sufficient guarantee against a subsequent deflection of the operating shaft, as *the filiform may be dragged out of the bladder, and doubled back upon it*, which *must* take place should the shaft be forced out of the canal anterior to the Stricture. This is an accident which may occur without the use of any very great amount of force.



AUTHOR'S DILATING CATHETER.

With the view of affording aid in the preparatory dilatation of Strictures too small to admit the necessary instruments for immediate operation, I have designed the accompanying modification of Sir Henry Thompson's probe-pointed catheter. It consists simply of a fine probe-pointed silver tube, eleven inches in length and three millimetres in circumference at its point, gradually increasing in size, so that at six inches it is six millimetres. This tube is traversed by a steel stylet throughout its length. Carefully insinuated through close Stricture, by the aid of a finger in the rectum, until its point may be supposed to have reached the bladder, the stylet is removed and a small syringe is applied to its proximal opening. If the instrument has passed the *sphincter vesicæ*, on a withdrawal of the piston, the urine will appear in the barrel of the syringe. The instrument may then be confidently pressed onward until the Stricture is dilated to the largest capacity of the tube—a second tube, of corresponding form, but with dimensions ranging from four millimetres at the point to eight millimetres, may then be similarly used.

In cases where, on account of the extreme closeness of the Stricture, or from its divergent or tortuous course, a difficulty in passing the instrument occurs, Dr. Gouley's whalebone *guide-bougies* will prove serviceable. These are used as in his grooved, canulated stiff, viz., by the previous introduction of the guide-bougie into the bladder, *threading the dilating catheter upon it and following it down through the Stricture.* Succeeding in this manœuvre, the guide-bougie may be removed—the presence of the dilating catheter in the bladder tested by aid of the syringe—the stylet introduced and the Stricture dilated, as previously described. The whalebone guide-bougies, to be used in this manner, require to be from sixteen to eighteen inches in length. They are easily made of *any* desired length and fineness, and, by passing them rapidly through the flame of an alcohol lamp, may be moulded at the extremity to any curve or angle deemed most likely to adapt itself to the eccentricity of the Stricture.

In comparison with all other instruments for the same purpose, the relatively smaller calibre of the dilating catheter must give it an important advantage in cases of Stricture of extreme tenuity. From its stiff and diminutive point it should never be used without the whalebone guide, nor even then with any degree of force, *until the presence of its point in the bladder has been verified by the passage of urine through it.* In several instances the dilating catheter in my hands has made way for the operating shaft of various instruments for immediate operation where other means had failed, notably in a case at the University College Hospital, London, in the service of Mr. Berkeley Hill. Repeated attempts to enter the bladder had been made in several hospitals without success. A final attempt had resulted similarly, and the patient was about to undergo the perineal section when Mr. Hill proposed a trial of the Dilating Catheter. The fine whalebone guide 2 mm. in circumference passed easily, the catheter was threaded upon it, and after reaching the blad-

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der was pressed on to its full size. On withdrawal, the shaft of M. Maisonneuve's urethrotome passed readily and Mr. Hill completed the restoration of the urethra by the Maisonneuve blade, supplemented with his own modification of the dilating urethrotome. On several occasions I have passed a small Stricture with it without the least force, (following the whalebone guide,) and using it only as a catheter, by attaching its proximal extremity to the aspirator or to an ordinary syringe, have emptied the bladder through it without dilating the Stricture. The aspirator will in the same way frequently be found of service during the use of small gum catheters.

The risks attendant upon the operation of urethrotomy vary necessarily with the gravity of the difficulties present in each case. It may be alleged that the cases which I have reported are chiefly those where the Strictures were of comparatively large calibre and for the most part in the penile portion of the urethra. In reply, I would say that the cases have been taken in the order of their presentation in my practice, and that a very large proportion had been under treatment by other surgeons, some of them for years, for Strictures supposed to be in the deep urethra. The treatment had been carried out in many cases by dilatation and by various cutting and divulsing measures, in accordance with the methods in vogue before any introduction of dilating urethrotomy. That the Strictures were more often situated in the anterior portion of the canal, and were less important than had been supposed, should be credited to my methods of exploration. That the results which I have obtained are favorable beyond any before presented to the profession, I claim to be due to the complete division of Strictures in manner calculated to produce the least possible disturbance of the healthy tissues. The fact that during the period, and in the great number of cases covered by my report, I have found it necessary to operate by external urethrotomy 18 times (11 times without a guide) is a sufficient proof that the range of my practice has not been limited to insignificant troubles, but that it has included every variety and degree of urethral contraction.

The accompanying tables* present the salient points in one hundred and thirty-six cases of urethral Stricture treated upon the principles presented and maintained in the previous pages of this volume. The form of tabulation is the same as that used in presenting the 100 cases operated on previous to March, 1875. Sixty-five out of these later one hundred and thirty-six cases were tabulated from my private case books by my former assistant, Dr. J. Fuhs, the remaining seventy-one cases were extracted from the same source by my associate Dr. L. Bolton Bangs, to whose faithful and intelligent assistance in nearly every operation, (in many sharing with me the labor and responsibility of the after treatment,) I owe not a little of the success which the following summary of these operations serves to demonstrate.

Whole Number of Cases Tabulated in 2d Series	136
Number of Strictures	357
" " Operations	186
Number with organic Stricture deeper than 5 inches	5
" treated by other surgeons for supposed deep Stricture	13
" of these cured by division of the meatus alone	7

Accidents after Operation.

Hæmorrhage, exceptional	6
Of these, serious, (one being combined with external perineal section)	2
Chills or Urethral Fever	11
Suppression of Urine (external perineal urethrotomy combined)	1
Incurvation of Penis—slight, lasting short time	3
" 1½ month	1
" 4 months	1
" 1 year	1
	6

Results.

Cases—Re-examined. No Recontraction	38
" Not re-examined.—Continued relief to all symptoms, including cures after secondary operation—reported cured	65

* See p. 324, et seq.

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Reported improved.	Not re-examined	20	
Not improved "	"	4	
Lost sight of		3	
Still under observation		4	
		33	136

Number of cases of Gleet—78—Cured		61	
	Improved	13	
	Not Improved	4	
		78	

Number of cases of reflex trouble—48—Cured		29	
	Improved	11	
	Not improved	8	
		48	

The point of greatest importance claimed as the result of complete division of Strictures, followed by suitable after treatment, is the *Radical Cure of Stricture.* Since my first re-examination of urethræ, the subject of operation by dilating urethrotomy, I have embraced every opportunity to test the presence or absence of recontractions of the divided Strictures; in each case carefully noting the results in my book of daily record. From 1872 to 1875, out of the one hundred cases operated on, thirty-five cases were re-examined at periods varying from six months to three years from the date of last operation.

Of these thirty-five cases recontraction of the Strictures occurred in but four cases. Leaving thirty-one claimed as radical cures out of thirty-five cases operated on.

From 1875 to 1878 the re-examinations as seen by following statement have amounted to eighty-two. In this number are included all cases presenting, previously operated on, without regard to any previous re-examinations. In the following record of the eighty-two re-examinations above alluded to, in no case has more than a single re-examination been recorded (and that the last) in any one case. The results showing seventy-four cures out of the eighty-two cases re examined

prove in a striking degree all that has been heretofore claimed by me in regard to the radical cure of the Stricture. Thus:

RE-EXAMINATIONS.

No Re-contraction..... 67 cases.

6 years and 6 months	after operation		3 cases.
5 " " 2 "	"	"	1 case.
4 " " 9 "	"	"	1 "
4 "	"	"	2 cases.
3 " and 8 months	"	"	1 case.
3 " " 4 "	"	"	1 "
3 " " 2 "	"	"	1 "
3 "	"	"	7 cases.
2 " and 6 months	"	"	3 "
2 " " 3 "	"	"	2 "
2 " " 1 month	"	"	1 case.
2 "	"	"	7 cases.
1 year and 10 months	"	"	1 case.
1 " " 9 "	"	"	1 "
1 " " 8 "	"	"	1 "
1 " " 5 "	"	"	3 cases,
1 " " 4 "	"	"	2 "
1 " " 3 "	"	"	4 "
1 " " 2 "	"	"	1 case.
1 " " 1 month	"	"	1 "
1 year	"	"	7 cases
10 months.....	"	"	2 "
9 "	"	"	2 "
7 "	"	"	2 "
6 "	"	"	4 "
5 "	"	"	3 "
4 "	"	"	1 case.
2 "	"	"	1 ",
1 month	"	"	1 "

RE-CONTRACTIONS.

3 years after operation	1 case.	At $2\frac{3}{4}$ in.	No return of symptoms.
3 " " "	1 case.	At meatus.	Return of symptoms. 2d operation. Cure.
1 year " "	1 case.	At meatus.	2d operation. Cure.
10 m'ths " "	1 case.	At meatus and at 4 inches.	Partial return of symptoms. 2d operation, with relief.
6 " " "	1 case.	At meatus.	2d operation. Cure.
4 " " "	1 case.	At meatus.	2d operation. Relief.
3 " " "	1 case.	Return of symptoms.	

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2 m'ths after operation	1 case.	At 3¼ in. 2d operation. Cure.
2 " " "	1 case.	At meatus. 2d operation. Great relief.
2 " " "	1 case.	At 5½ in. 2d operation. Cure. *Remains well for 2½ years.*
1 month " "	1 case.	At meatus. 2d operation. Great relief.
1 " " "	1 case.	At meatus. 2d operation. Cure. Remains well for 2½ years.
1 " " "	1 case.	At meatus. Partial return of symptoms.
Time not noted	2 cases.	1. At meatus. 3d operation. Relief. 1. At 6 inches. Return of symptoms.
Total	15 cases.	

Out of the 15 cases of re-contraction, 9 were at the meatus alone.

" " "	Return of symptoms.	Secondary operation. Cure. 6
	Return of symptoms.	" " Relief.
	No symptoms.	Well when last heard from..... 5
	Return of symptoms.	No secondary operation..... 3
	No return of symptoms.	 1

CHAPTER XVII.

CONCLUSION.

THE points which are claimed to have been established by my observations are:

1. That the urethra is an *individuality*, and hence to obtain the true normal calibre of any urethra, it must be measured, or estimated, independently of any other.

2. That the meatus urinarius is worthless as a guide to the normal urethral calibre, and that its abnormal contraction is the cause of the pouch-like dilatation of the urethra behind it, known as the *fossa navicularis*.

3. That Stricture is a relative term. Hence its extent must always be estimated by comparison with the previously ascertained normal calibre of the urethra under consideration.

4. That the slightest *abnormal* contraction of the urethra, at any point, constitutes a Stricture.

5. That a Stricture, in this sense, is always a point of friction, the legitimate tendency of which is to produce inflammation; and hence the slightest appreciable Stricture may become worthy of consideration. That serious trouble often results from Strictures which but slightly contract the calibre of the urethra and which do not markedly interfere with the passage of urine; and that among such troubles *spasmodic Stricture*, simulating true organic Stricture in every respect, is often caused by such slight contractions.

6. That Stricture is *a* cause though not the *only* cause of gleet; and is, when present, always a cause of its persistence.

7. That true Stricture always embraces the entire circumference of the urethra at *some* point.

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2 m'ths after operation	1 case.	At 3¼ in. 2d operation. Cure.
2 " " "	1 case.	At meatus. 2d operation. Great relief.
2 " " "	1 case.	At 5½ in. 2d operation. Cure. *Remains well for 2½ years.*
1 month " "	1 case.	At meatus. 2d operation. Great relief.
1 " " "	1 case.	At meatus. 2d operation. Cure. Remains well for 2½ years.
1 " " "	1 case.	At meatus. Partial return of symptoms.
Time not noted	2 cases.	1. At meatus. 3d operation. Relief. 1. At 6 inches. Return of symptoms.
Total	15 cases.	

Out of the 15 cases of re-contraction, 9 were at the meatus alone.

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	Return of symptoms.	" " Relief.
	No symptoms.	Well when last heard from..... 5
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8. That complete division of Stricture at *any* point results in the *immediate disappearance* of the Stricture.

9. That separation of the sundered ends of the Stricture. suitably maintained until the healing of the wound, prevents the return of the Stricture, and finally results in the complete absorption of the stricture-tissue.

10. That Stricture is, *as a rule*, an inflammatory product, and that any acute or chronic inflammation may produce it.

11. That Stricture is often present as a result of inflammation caused by *lithiasis*, *masturbation*, or *urethral laceration*, (by gravel, etc.,) though usually the sequel of a gonorrhœa.

12. That Stricture occurs most frequently in the anterior portion of the canal; and with increasing frequency when approaching the meatus where a gonorrhœal inflammation begins the earliest, rages the hottest, and lasts the longest.

From authorities and their followers who have hitherto denied the possibility of radical cure of urethral Stricture, I anticipate continued denial, until they shall have conscientiously and exactly carried out the plans and procedures through which my success has been attained, and have had the opportunity of testing the results by years of observation as I have done. In the meantime others, distinguished as teachers of surgery, and recognized as independent, honest and capable observers, like Professor Pease, Professor Brown and Dr Mastin, will aid me in educating the general profession up to the point of departing so far from established doctrines as to give the rational treatment of Stricture a fair trial. This effected, I believe the day will not be far distant when close Stricture will be esteemed a surgical opprobrium, and the continuous treatment by dilatation, except under rare and peculiar circumstances, will be relegated to physicians or to the patient, and this only as a temporary expedient to be practiced until competent surgical aid is attainable.

I am prepared to assert that such results as I have recorded, are not exceptional and may be attained by any surgeon who

will provide himself with the necessary instruments for the performance of dilating urethrotomy, and use them in accordance with the plans and principles previously enforced and *with the exercise of such judgment and skill as are considered essential to success in any other operation of like importance.*

NEW YORK, JULY 1ST, 1878.

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Number of case.	Age of Patient.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complications.	Number of Operations.	Accidents after Operation.	Result.	Re-examination.	Remarks.
1	62	Gon. 43 years previously, several attacks since.	3	Meat. 28 2 in. 2½ in.	30 30	34	Frequent micturition every 30 minutes. Pain after urination.	Spasmodic Strict. at 6 inches. False passage.	2	1 Chill	Divided Stricture at Meat. only. Immediately after operation urinated once in 10 hours, habitually once in 6 hrs. No pain after micturition. Relief for 4 mos. Recontraction to 29; 2d operation, immediate relief.		Had been treated for deep Stricture by other surgeons.
2	32	Gon. 7 ys. previous; several times since.	3	2½ in. 3 in. 3¼ in.	34 19 34	37	Gleet for seven years.		4	Curvature of Penis.	Cure of gleet. Curvature of Penis cured in 1½ months.		
3	25	Gon. 2 years previous.	3	Meatus. 2½ in. 3¼ in.	25 30 30	34	Frequent micturition. Pain when urine is retained. Erections imperfect.		1		Immediate cure of frequency of micturition and of pain.		
4	37	Masturbation.	4	Meatus. 1 in. 3 in. 3½ in.	30 34 34 34	38	Frequent micturition during day and night. Pain in back and hypogastrium. "Scalding" in urethra.	Erections imperfect. Purulent urine with spermatoza	1	Urethrit. dipth'tic. deposit at Meat	Cure of frequent micturition and pain. Erections perfect.		
5	33	Gon. 12 years previously.	3	Meatus for 1 in. 4 in.	24 34	36	Urinates every ¼ to ½ hour. Throbbing pain along urethra; constant pain along back and over pubes. Discharge off and on for over a year.	Purulent urine.	1	.....	Immediate relief to frequent and painful micturition and pain. Entire cure in one month.	3 years and 4 mos. after operation. No recontraction.	
6	29	Masturbation.	1	Meat.	20	28	Urinates 4 to 5 times at night. Pain in perineum and testes; mucus extruded with pain after urinating.	Seminal emissions frequent.	1	Retention of urine.	Cure immediate....	3 years after, no recontraction.	
7		No History.	2	2 in. 2½ in.	30 30	34	Gleet four years.	Throbbing in testicles. Spasmodic contraction of penis. Pains in thighs and legs.	1	.....	Cure		
8	51	Masturbation. Gon. 29 years previously.	1	½ in.	24	36	Frequent and difficult micturition and at night.	Urine muddy.	1	.....	Cure in two weeks..		
9	26	Masturbation. Gon. 5 years previously and every year since.	3	Meat. 2¾ in. 3¾ in.	21 14 14	32	Gleet. Painful micturition and erections. Frequent urination.	Frequent seminal emissions and imperfect erections.	5	Curvature of Penis 4 months.	Great improvement.		Curvature lasting four mos. resulting in great measure from loss of erectile power present before operation.

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.	Remarks.
10		Mastur-bation.	3	Meatus. 2¼ in. 3 in.	21 24 24	32	Pain over pubes and in testicles. Great despondency. Frequent urination.	Frequent seminal emissions.	1	Hemorrhage easily controlled.	Cure	10 mos. after. No recontraction.	
11	47	Gon. 27 years ago.	3	Meatus. 3 in. 4 in.	 33 33	36	Intense pain at coitus. Constant pain in thighs and perineum, robbing him of sleep.	.....	1	.....	Much improved....	....	
12	25	Gon. 12 years ago and several times since.	4	Meatus. 2⅛ in. 3 in. 4 in. 4½ in.	28 24 28 32	32	Gleet 4 years. Pains in testes. Follicular ulceration of urethra.	Perineal abscess.	2	.....	Cure	3 years after. No recontraction.	
13	37	Mastu'bation. Gon. 19 years before, and several times since.	1	Meatus. ¼ in.	23	38	Frequent seminal emissions; premature ejaculation; soreness along urethra.	.....	2	.....	Cure of urethral trouble. Relief to seminal trouble.	.....	
14		.....	4	Meatus. 3½ in. 3¾ in. 2¾ in.	32 32 34 34	36	Gleet ..... Frequent micturition.	.....	1	.....	Cure	.....	
15	36	Urethritis.	4	2 in. 3½ in. 4 in. 4½ in.	24	36	Gleet	acute gonorrhœa of 4 months standing.	2	Smart hemorrhage. Curvature of Penis.	Cure ..... Curvature of penis (one year).	.....	Operation during acute inflamm'tory condition, resulting in prompt relief of this condition, which had existed for 4 mos. previously. Final complete disappearance of the incurvation and cure.
16		No history.	2	Meatus. 3 in.	23 28	34	Gleet for one year.	.....	1	.....	Cure	.....	
17	26	Gonorrhœa.	3	Meatus. ⅛ in. 2½ in.	30 28 33	34	Discharge without exposure. Painful and frequent micturition (every ½ hour); pain in penis and testicles.	Chron. hydroch (double)	1	Epididymitis.	Cure	.....	
18	54	Gon. 30 years previously.	3	Meatus. ¼ in. 2 in.	27 27 27	34	Constant burning pain at neck of bladder and along urethra. Frequent painful micturition. Has had retention.	Cut for stone 1 yr. previously with no relief; bladder t'ouble	1	.....	No relief. Meatus only divided.	.....	Trouble subsequently found to be dependent upon pyelitis.
19	37	Gon. 14 years previously, and several times since.	2	Meatus. 2 in.	 28	34	Gleet	.....	1	.....	Cure	9 months after no recontraction. 3 years after continues well.	

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20	39	Gon. 19 years previously, and several times since.	2	Meatus. 1 in.	33 33	34	Frequent micturition. Pricking and numbness in anus and legs.	Loss of sexual desire.	1	.....	Not heard from.	.....	Operated on for another surgeon who took charge of him.
21		Gon.	3 3	bands 1½ to 2 in. 2½ to 3½		34	Gleet	.....	1	.....	Cure	.....	
22		Masturbation.	2	Meatus. 2¼ in.	32	34	Seminal weakness....	.....	1	.....	Relieved, but not permanently.	3 years after. No recontraction.	
23	45	Gon. 20 years previously, and gleet occasionally since.	4	Meatus. 1½ in. 2½ in. 4 in.	30 30 30 30	34	Pain at penis after urinating. Attacks of frequent urination. Pains in thighs and hips.	.....	1	.....	Cure	.....	
24	23	No venereal.	3	 ½ in. 3 in. 4 in.	 24 25 25	34	Frequent micturition (every ½ hour). Pains in hypogastrium, thighs and down legs.	.....	1	.....	Cure	Re-examined 7 mos. No recontraction. 3 years after continues well	

25	50	.....	5	Meatus. 1½ in. 2½ in. 4 in. 6½ in.	 1	34	Retention of urine.	Perineal fistulæ and abscess.	1	Slight chill.	Immediate relief ...	5 months later 33 sound passes with ease, but one fistula is open.	The combined operation was done (external and internal.)
26		Gon. 7 years.	3	1 to 4 inches.	25	34	Imperfect erections and premature discharge.	.....	1	.....	Relief and final cure	Well 3 years after.	
27		.....	1	Meatus.		38	....	.....	1	.....	Cure	3 years after. No recontraction.	
28	33	Gon. 12 years and 6 mos. previously.	4	Meatus. ¾ in. 2 in. 2¾ in.	25 25 27 23	36	Gleet. Urinating every ½ hour. Vesical tenesmus.	.....	1	.....	Immediate relief. Urinated in 6 or 8 hours.	.....	Return of vesical tenes. Division of Stricture incomplete. Patient to return for thorough division.
29	34	Gon. 18, 4 and 3 years previously.	2	¼ in. 1¼ in.	25 23	32	Gleet recurring without cause.	Vesical catarrh. General debility.	1	Urethritis.	Cure. Relief of nervous symptoms.	4 mos. after, no recontraction, to 32 bulb. 2 yrs. 9 mos. after. remains well.	
30	23	Gon. 6 mos. before.	1	Meatus.	24	32	Gleet	Indefinite, uneasy sensations in canal.	1	.....	Relief to nervous sensations in two weeks. Cure of gleet.	....	
31		Gon 2	5	Meatus. 1¾ in. 2½ in. 2¾ in. 4 in.	27 27	38	Gleet. Pain at meatus	.....	4	Diphtheritic deposit on wound.	Cure	2 years after operation. No recontraction.	

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32	29	Gon. 14 mos. previously.	2	From Meatus $\frac{1}{2}$ in. 3 in.	25 30	33	Gleet; prostatic irritation; nervous feeling in groin, perineum and over pubes.		1	.....	Improved but lost sight of.	7 months after, slight recontraction at meatus detected by 32 f. bulb	
33	35	Gon. repeated	2	at Meat. 2 in.	26 28	33	Gleet of several years standing.		1	.....	Cure	One year after operation continued well.	
34	42	Gon. 23 and 16 years previously.	2	Meatus. 2$\frac{1}{2}$ in.	28 30	32	Cystitis, gleet. Pains in loins and back.	Cystitis. Residual urine.	1	.....	Cure of Strictures and cystitis. Disappearance of gleet and reflex pains.	19 months after operating no recontraction.	
35		Gon. 15 years previously.	4	Meatus. 2$\frac{1}{2}$ in. 3 in. 4 in.	26 25 25 25	32	Gleet. Oozing from prostate after stool. Uneasy sensation in inguinal region. Pain in back and groin.		2	.....	Cure of Strictures of prostatic and reflex troubles. Disappearance of gleet.	.....	
36	28	Laceration of urethra caused by being thrown out of a carriage 8 years previously.	3	Meatus. 3 in. 5$\frac{1}{2}$ in.	26 .. 12	34	Imperfect erections for last 5 and 6 years. Pain in back and loins.	.....	2	2 Chills	Cure of his troubles for two mos. Return of some of his troubles. Recontraction of deep Stricture. Division of it.	5 months after first operation. No recontraction of anterior Strictures. Recontractions to 21 f. of Strict. at 5$\frac{1}{2}$ in.	Deep Stricture divided by external incision 7 ys. previously by Dr. Tayer, of Cleveland, Ohio. Second operation 2 years after, continues well.
37	39	Gon. 22 and 17 years previously.	5	Meatus. 3 bands from 2$\frac{1}{2}$ to 3 in.	24 26	30	Incontinence of urine. Pain in hips and thighs. Occasional attacks of retention urine. Great physical debility and mental demoralization.	Residual urine. General health very bad. Deep spasmodic Stricture.	3	2 slight chills on day of operation 2 chills 3 days later, after introduction of instrument 1 chill on 5th day after operation from the same cause.	Perfect relief of his troubles for about one month. Intervals of micturition from 4 to 6 hours. Return of frequent urination; recontraction of meatus to 24 f. Division. Cure.	2$\frac{1}{2}$ years after perfectly well.	13 years previously patient was operated on for supposed deep Strict. without relief, and since then frequent unsuccessful attempts at catheterism had been made. Frequent attacks of retention urine before present operation, relieved at night by involuntary enuresis.
38	47	Gon. 17.	1	1 inch from Meat.	27	38	Frequent micturition. Severe hypogastric pains.	Occasional attacks of retention of urine.	2	... .	Cure	Re-examined 6 months. No recontraction.	Treated for supposed deep Stricture by other surgeons.

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39	34	Gon.	1	Meatus.	24	34	Gleet	Syphilis.	1	.....	Cure	2 years after operation. No recontraction.	
40	36	Gon. 16 and 7 years previously.	5	Meatus. 1 in. 2¾ in. 3 in. 4⅛ in.	30 28 28 28 32	34	Painful micturition. Drawing sensation behind scrotum, at thigh and groin. Burning sensation in rectum and rectal tenesmus.	Enlarged prostate.	3	1 chill.	Cure of his troubles. Recontraction twice at meatus, causing a temporary return of his symptoms. After 3d operation disappearance of all his symptoms.	1 year after last operation. No recontraction.	
41	24	Gon. 4 and 1½ years previously.	3	Meatus. 3 in. 3½ in.	24 33 33	36	Gleet	Syphilis.	2	.....	Cure	2½ years after, remains well of Stricture. Has tertiary syphilis.	

42	47	Gor.. 23 years previously.	7	Meatus. 4 bands in pendulous part 2 bands in membranous part	24 24 to 28 12	38	Painful and frequent micturition. Most of urine escapes through fistulous openings.	3 urethral fistulæ. Kidney disease.	1	2 chills. Suppression of urine lasting one day.	Cure	15 months after operation no recontraction. No fistulæ.	Operated on by perineal sec. 2d yr. previously by Dr. Agnew, of Phil. Present operation consisted in a div. of deep Strict. by external and of the anterior bands by internal urethrot'my (comb'd operation). Nearly 2 ys. after (Oct. '77) recontract. to 28 at 1in. with sw'lling in perineum. Ope tion with disappearance of sw'lling and great relief. Jan. 1878 2 yrs. after operation 1 fistula reope'd while run down from malaria.
43	35	Gon. 15 years previously.	5	Meatus. 2 in. 2½ in. 3½ in. 2 bands at 4 in.	15 23 23 24	32	Painful and frequent micturition. Dribbling. Nervous feeling in testicles.	Long prepuce.	1	Diphtheritic deposit at meatus.	Much improved. Relief of troubles for about one month. Recontraction at meatus with return of some difficulty in micturition.	.....	Circumcision was performed, besides urethrotomy.
44	31	Gon. 8 and 4 years previously.	1	½ in.	24	30	Gleet	Spasmodic deep Stricture.	2	.....	Temporary improvement. Cure.	6 months after operation. No recontraction.	Had been treated for deep Stricture by other surgeons.

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45		Masturbation. Gon.	1	Meatus.	31	34	Frequent seminal emissions.	.....	2	.....	Cure	Remained well for one year, then had another gon.	
46		Gon. 8 years previously.	1	Meatus.	14	31	Gleet for 4 years	Spasmodic deep Stricture.	1	.....	Cure. Recontraction and return of trouble 1 year after. 2d operation and relief immediate.	....	Had been treated for deep Stricture by other surgeons.
47	19	.....	1	Meatus.	23	30	Frequent and painful micturition for twelve years.	Stone in bladder.	1	.....	Cure	....	
48		10 mos. previously had gon.	2	Meatus. 3 in.	23 30	35	Gleet	.....	1	.....	Lost sight of.	.....	
49		Gon.	3	Meatus. 4 in. 6 in.	23 Close Close	34	Tenesmus and pain over pubes, penis and perineum.	Cystitis.	1	Chills severe.	Reontraction. Recovery from cystitis. Postponing 2d operation, continues treatment by dilatation on his own account.	.....	Stricture at 6 in. divided by Maisonneuve urethrotome.

50	70	Denies Gon.	4	Meatus. 1 in. 2½ in. 3 in.	18 23 23 25	34	Can pass urine only through catheter. Pain in penis. Much pus and blood in urine. Passes his urine every half an hour.	Cystitis.	1	....	Cure ..... Constant improvement since operation. Passed his urine without catheter, about one in 2 hours, 1½ months after operation.	.....	
51	35	Gon. 13 years previously.	1	Meatus.	32	35	Gleet	.....	1	.....	Cure of gleet	2 years after No recontraction.	Deep Strict. repeatedly divided by other surgeons by external and internal incision, with short and inconsiderable relief.
52	30	Gon. 2½ years previously.	1	Meatus.	27	34	Gleet. Frequent involuntary seminal discharges. Pain in groins around rectum. Dribbling after urination.	Long prepuce.	1	.....	Cure perfect	2 years after operation. No recontraction. Cure perfect.	Circumcision was performed also.
53		Gon.	1	Meatus.	22	34	Micturition every half an hour and very painful.	Cystitis.	1	....	Much improved.	....	Perineal sect. performed by other surgeon Jan., 1876, to relieve cystitis. External wound not healed.
54	15	Masturbation.	1	Meatus.	12	26	Occasional nocturnal incontinence. Seminal emissions every night.	Epileptic attacks.	3	.... ..	Temporary relief of headache and epileptic attacks. Return of trouble.	.....	

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55	52	Gon. 5 and 2 years ago.	3	Meatus. 2½ in. 3½ in.	27 24 24	36	Irritability of bladder.	.....	1	Chill.	Relief of all symptoms. Not heard from since.		
56		Gon.	1	Meatus.	24	36	Gleet 1 year. Treated for supposed deep Stricture by other surgeons.	Spasmodic Stricture at 5½ inch.	1	.....	Cure of gleet and spasmodic Stricture.	.....	Treated for suppo'ed deep Stricture by other surgeons.
57	37	Gon. 17 years previously, and several times since.	2	1 in. 3½ in.	25 35	36	Gleet for 10 years. Frequent micturition. Dribbling after micturition. Pain in perineum.	Enlarged prostate. Residual urine slight.	1	.....	Cure	1 year and 10 months after operation no recontraction.	
58	27	Masturbation.	4	Meatus. ¼ in. 2½ in. 3½ in.	27 32 28 32	33	Frequent seminal emissions.	.....	1	.....	Cure	2 years after operation no recontraction. Perfectly relieved from all trouble.	

59	34	Masturbation Gon. 3 years previously.	1	Meatus to ¾ in.	23	33	Imperfect erection. Premature emissions with pain about sphincter ani. Burning in urethra. Treated for deep Strict. by other surgeons.	.....	1	.....	Cure	Re-examined 1 yr. and 9 mos. after operation. No recontraction.	Treated for supposed deep Stricture by other surgeons.
60	25	Gon. 5 years previously.	4	¼ in. ½ in. 1 in. 3 in.	26 26 26 30	33	Gleet	.....	2	Painful erections	Discharge disappeared shortly after operation. Dissipation caused a fresh discharge 4 months after operation with recontraction of 2 Strictures at Meat. and 3 inches. Redivision.	No re-examination.	
61	32	Gon. one year previously.	2	Meatus. 2½ in.	24 28	33	Gleet	.....	1	.....	Cure	5 months after operation. No recontraction.	
62	40	Gon. 7 years	1	1 in.	23	35	Pain in perineum. Gleet.	Enlarged prostate. Residual urine.	1	.....	Cure. Pain disappeared after operation.	.....	
63		.....	1	4½ in.	30	34	Frequent micturition.	Spasmodic deep Stricture.	1	.....	Greatly improved ..	....	Treated for supposed deep Stricture.
64	23	Gon. 10 mos. previously.	3	Meatus. 1 in. 2½ in.	15 29 29	36	Gleet.	.....	1	.....	Cure	.....	

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65	44	Gon. 16 years previously.	4	Meatus. 2 in. 4 in. 5 in.	15 21 15 5	32	Gleet. Urinates every one-half hour.	.....	1	1 chill. Slight hæmorrhage.	Cure	1 year after operation. No recontraction.	Deep Strict. divided by Maisonneuve's urethrotome.
66	25	Gon. 2½ years previously.	2	Meatus. 1 in. 2¾ in.	28 25 25	30	Gleet. Frequent and painful urination. Dribbling. Pain in hypogastrium, pubes, & legs. Involuntary movements of limbs. Pain at neck of bladder. Desire to urinate after evacuation of bowels, for one hour or more.	.....	2	Painful erections	All troubles except pubic pain disappeared in one week. Return of prostatic irritation. No return of Strictures or gleet.	.....	
67	30	7 years and also 9 mos. previously.	1	Meatus. to 3⅛ in.	25	34	Gleet. Uneasy sensation about genitals.	.....	2	.....	Improvement after each operation, final cure after 3 months.	6 months after first operation recontraction of Stricture at ½ inch to 28 f. Has painful erections. 2d operation cure.	

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68	31	Masturbation.	2	Meatus. 3½ in	25 29	32	Imperfect erection. Nocturnal seminal emissions.	.....	1	.....	2½ weeks after operation has perfect erections. Cure.	1 yr. and 8 mos. after no recontraction.	
69		Gon. 3 mos. previously.	2	Meatus. 1½ in.	16 28	34	Retention of urine. Gleet. Vesical tenesmus. No. 7 only passes in bladder.	Enlarged prostate.	1	.....	Cure	.....	
70	31	Gon. 9 years previously.	4	Meatus. 1½ in. 2½ in. 4½ in.	30 24 24 18	34	Gleet. Small and divided stream. Dribbling. Frequent and painful micturition.	.....	3	Slight incurvation of penis. Chills.	Cure complete	....	
71	24	Gon. 6 years and also 8 months previously.	1	Meatus. 2¾ in.	25 34	36	Transparent discharge.	.....	3	.....	Cure ..... Excess only causes return of gleet. 2d operation for deep Stricture. Still under treatment.	5 months after operation. No recontraction.	Meat. divided at 1st operation. About 2 yrs. after 1st operation returned for division of deep Stricture.
72	26	Gon. 6 years previously and several times since.	4	Meatus.	18 1½ 2 3½	36 not given	Gleet. Reflex pains over pubes and perineum.	.....	1	.....	Cure	.....	
73	16	No cause given.	1	Meatus.	22	34	Frequent and painful urination.	.....	2	.....	No improvement...	.....	

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74	26	No cause given.	1	Meatus.	22	32	Great difficulty of starting the act of urination. Frequent micturition.	.....	1	.....	Perfect cure	4 months after operation no recontraction.	
75	44	Gon. 6 years previously.	2	Meatus. 3 in.	30 30	35	Frequent and painful urination. Small stream. Pain in perineum, rectum and supra pubic region. Feeling of fullness in pelvis.	.....	1	.....	Never heard from ..	.....	Length of urethra ten inches.
76	27	Gon. one year previously.	1	Meatus.	29	34	Gleet. Dribbling after urination. Painful "tickling" sensation at glans penis.	.....	1	.....	Cure	4 months after operation no recontraction.	
77	37	Gon. 15 years previously.	1	Meatus.	28	34	Gleet. Frequent micturition.	.....	1	.....	Cure	5 months after operation no recontraction.	
78	60	Gon. about 6 months previously.	4	Meatus. Membranous portion 3 bands	28	34	Micturition prolonged.	Perineal abscess. Rectal fistula.	2	Hæmorrhage.	Cure	.....	The combined operation was performed.
79	38	Masturbation Excessive venereal indulgence.	2	Meatus. $2\frac{1}{2}$ in.	27 26	32	Imperfect erections. Premature emissions.	.....	1	.....	Lost sight of.....	.....	
80	32	Ulcers in urethra 3 years previously.	1	$1\frac{1}{2}$ in. to Meatus.	24	32	Gleet	Syphilis.	2	Hæmorrhage.	Cure	.....	
81	24	Gon. 5 years previously, and several times since.	1	Meatus.	31	36	Gleet 2 years. Vesical tenesmus.	Prostatic enlargement.	1	.....	Much improved....	4 months after operation. No recontraction.	
82	29	Gon. 12 years previously, and several times since.	3	Meatus. 3 in. $3\frac{3}{4}$ in.	30 30 30	38	Burning sensation in deep urethra. Gleet.	Prostatic enlargement.	3	.....	Discharge disappeared. Much improved generally.	....	
83	23	Gon. 6 mos. previously.	4	Meatus. $3\frac{1}{2}$ in. 3 bands	30 28	34	Gleet. Pain in glans penis, back and testicles. Frequent and painful micturition.	Cystitis.	1	.....	Cure after 3 months.	One year after operation continues well.	
84	25	Masturbation.	1	Meatus.	23	34	Dribbling after urination. Frequent seminal discharges. Imperfect erection. Premature emission. Despondency.	Long prepuce.	1	.....	Much improved.	....	Circumcision was also performed.

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85	35	Masturbation.	4	Meatus. 2⅔ in. 3 in. 4 in.	22 31 25 31	32	Frequent seminal emissions. Tremulous sensation in lower extremities. Imperfect erections. Dribbling. Persistent pain in hypogastric region aggravated by seminal emissions.	.....	1	.....	Cure	.....	.....
86	25	Gon. 10 mos. previously.	1	Meatus.	23	32	Gleet	.....	1	.....	Cure	.....	
87	26	Gon. 4 and 2 years previously.	1	⅓ in. from ½ in. to 3 in. Several bands.	28 31	32	Dribbles. Pain in back and lower extremities.	.....	2	Slight curvature of penis, disappeared in 1 month.	Cure	.....	
88	50	Gon.	2	Meatus. Close Strict at membranous urethra.		30	Dribbling. Frequent micturition. Gleet.	Perineal abscess.	1	.....	Cure	13 months after operation continues well.	Deep contraction divided by external division. No guide.
89	48	Gon. 20 and 18 years previously.	2	½ in. 4½ in.	18 21	30	Frequent micturition. Sense of obstruction at end of penis. Dribbling.	.....	2	.....	Cure	.....	The anterior contraction only was divided.
90	30	Gon. 3 and 2 years previously.	4	Meatus. ⅓ in. 2¾ in. 3 in.	29 27 29 29	34	Gleet. Discharge appeared 1½ year previously apparently without cause.	.....	1	.....	Improved. Recontraction found 3 months after operation.	3 months after, recontraction.	
91	60	Gon.	4	Meatus. 2 in. 2½ in. 3½ in.	32 32 32 32	36	Gleet. Irritability of bladder.	Slight enlargement of prostate. Cystitis.	1	.....	Cure perfect	One year after operation. No recontraction.	
92	31	Gon. 2 years previously.	5	Meatus. 1½ in. 2 in. 2⅞ in. 3¼ in.	25 30 30 26	32	Gleet. Sense of obstruction in urethra. Seminal weakness. Imperfect erections. Premature discharge. Hyperæsthesia of testicles. Atrophy of one testicle.	.....	1	Slight curvature of penis.	Cure	One year after perfectly well.	
93		Gon. 3 years also 3 mos. previously.	2	Meatus. 3 in.	28 26	32	Gleet. Pain in right hypogastric region and groin.	.....	1	.....	Pain disappeared after operation.	.....	
94	35	Gon. 12 years previously.	5	Meatus. from 1 to 2 in. 3 to 4 3 bands.	25 34 28	40	Gleet. Frequent attacks of retention requiring aspiration. Frequent micturition. Bladder habitually distended to umbilicus. Cannot retain urine when standing.	.....	2	.....	Cure of gleet. Relief for 10 mos. perfect. Volunt'y micturition every 4 hrs. Large stream immediately after operation and continued. 10 mos. after recontraction to 34 at Meat. and at 4 in. Return of frequent and difficult urination. No retention. 2d operation with immediate relief.	.....	Had been treated for deep Stricture by other surgeons. Two weeks later patient writes that troubles again threaten. Not since heard from.

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.	Remarks.
95	39	Gon. 18 and 10 years also one month previously.	1	Meatus.	25	34	Gleet (profuse). Prostatic tenderness. Irritability of neck of bladder. Straining and pain after urination.	Enlargement of right lobe of prostate	1	Diphtheritic deposit on wound.	Much improved.	2 months after operation no recontraction.	
96	40	Traumatic injury 17 yrs. and Gon. 4 yrs. previously and since.	1	Meatus.	14	32	Gleet. Sense of weight in perineum.	.....	1	.....	Much improved.	.....	
97	28	Gon. 11 and 7 years previously.	3	Meatus. 2 in. 3 in.	17 30	32	Gleet. Burning sensation in urethra after urination. Frequent micturition. Dribbling. Frequent seminal emissions. Imperfect erections. Severe pain in lumbar region. Pain in testicles and groin. Great depression of spirits with suicidal tendency.	Redundant prepuce.	1	.....	Much improved.	.....	Circumsion was also performed.
98	35	Gon. 16 years previously and several times since.	4	Meatus. $1\frac{1}{8}$ in. $3\frac{1}{4}$ in. $4\frac{1}{8}$ in.	15 25 11 36	36	Gleet. Divided stream.	.....	2	Slight hæmorrhage.	Recontraction. 2d operation 2 months later. Final cure.	.....	Marriage two months after 2d operation.
99		.....	2	Meatus. 3 in.	30 26	32	.....	.....	1	.....	Cure	1 yr. and 5 mos. after op'tion no recontraction.	
100	50	Masturbation Gon. 32 years previously.	2	Meatus to 1 in. 2 in.	25 30	35	Gleet. Griping pain above pubes after sexual intercourse.	.....	1	.....	Cure	6 months after operation no recontraction.	
101		Gon. 3 yrs. & $2\frac{1}{2}$ yrs. previously.	1	Meatus to $\frac{3}{4}$ in.	25	34	Gleet for $2\frac{1}{2}$ yrs. Severe pain at $\frac{1}{2}$ in. from Meat. tenes. and dribbling.	.....	1	.....	Relief in five days. Lost sight of.	.....	
102	29	Gon. $2\frac{1}{2}$ years ago.	1	Meatus to $\frac{1}{2}$ in.	26	32	Gleet for two years ...	.....	1	.....	Cure	.....	
103	18	Masturbation.	1	Meatus to 1 in.	26	32	Urination hesitating. Dribbles. Urethra very sensitive.	"Petit Mal," convulsion every day, or once a week. Unable to read.	3	.....	Immediate cure of urinary trouble. No attack of Petit Mal for 2 mos. Recontraction; operation. 3 mos. after reports only slight "faintings."	....	
104	21	Masturbation.	3	Meatus 3 in. $3\frac{1}{2}$ in.	26 31 31	34	Frequent seminal emissions. Dribbling.	....	1	.....	Great improvement.	.....	
105		Gon.	3				Retentions. In bed for yr. Frequent and difficult urination. Dilated for perineal Strict.	Calculus.	1	.....	Cure	.....	Dolbeau's operation. Calculus weighed $1\frac{1}{2}$ drachms.
106	28	Gon. several times.	4	Meatus. $2\frac{3}{4}$ in. $1\frac{1}{2}$ in. more or less for 3 inches	15 22 22	32	Gleet	.. ..	1	Urethral fever on 4 day after operation on passing sound into bladder.	Cure	.....	Gleet gave vaginitis to wife 4 days after marriage.

Number of case.	Age of Patient.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complications.	Number of Operations.	Accidents after Operation.	Result.	Re-examination.	Remarks.
107	4	Gon. 16 years ago, several times since.	1	Meatus.	23	37	Frequent urination every hour. Constant pain over pubes increased by holding urine.	Constriction of penis by prepuce.	4		Final complete relief. No apparent disposition to recontract.	.....	
108	21	Gon. 4 years previously.	4	Meatus. 4⅛ in. 3 in. 2½ in. 1 in.	28 28 26 26 26	34	Gleet. Frequent and painful urination and irritation at neck of bladder.	.....	1	Severe hæmorrhage.	Immediate relief to frequent urination and irritation.	....	
109	26	Gon.	1	Meatus. ¾ in.	23 23	35	Gleet for two years.	.....	1	.....	Much improved.	....	Had been treated for sub-pubic Stricture by other surgeons.
110	19	Masturbation Gon. severe.	4	Meatus. 2½ in. 3½ in. 4 in.	20 24 28 30	35	Gleet. Frequent and painful urination.	Constant pain in rectum and sacrum.	1	Urethral fever.	Relief to pain, but gleet continues. Still under treatment.		
111	35	Gon. 6 years previously.	3	From 2 to 3 in.	28	34	Occasional gleet. Frequent urination (every 2 hrs. in warm weather and every hr. in cold) Intense pain over pubes at neck of bladder and end of penis.	.....	1	See Remarks.	Immediate relief to pain, etc.	.....	Strictures were divided by the examination which was the only operation. Profuse bleeding followed. Sounds to 34 f. only were used.
112	33	Masturbation Excessive venery.	5	Meatus. 2 in. 2½ in. 3 in. 4¾ in.	28 30 26 26 28	32	Involuntary and premature emissions.	.....	1	Hæmorrhage.	Urethritis following neglect and exposure at night.	Recontraction.	
113	31	Congenital.	2	Meatus. 1½ in.	30 36	39	Frequent and painful urination every 15 or 20 minutes.	.....	1	.....	Immediate relief. Cure.	.....	
114	36	Gon. 20 and 18 years previously. "Abortive" injections.	6	Meatus. ½ in. 2½ in. 3 in. 4 in. 4¼ in.	18 20 20 20 18 18	34	Gleet for 18 years.	Redundant prepuce with phymosis.	1	.....	Cure. One month after operation writes that he is perfectly well.	.....	Operation of circumcision and division of Meatus done first.
115		....	1	Meatus.	20	38	Intense pain in urethra and at neck of bladder.	.....	2	.....	Immediate relief for four mo. Recontraction. 2d operation with complete relief	.....	
116	25	Masturbation.	1	1 in.	25	32	Frequent urination. Difficulty in starting urine. Dribbling very marked.	Pains at end of spine, in penis and perineum and down legs.	1	.....	Much improved. Passed from observation.	.....	
117		Gon.	3	Meatus. 1 in. 3½ in.	18 20 30	36	Gleet four months.	Frostate tender and swollen.	1	.....	Relief to prostate in 6 days. No record further.	....	
118		See No. 71.		.....			.....	.....		.....	.....	.....	
119	20	Gon.	3	Meatus. ⅞ in. 3½ in.	18 20 30	34	Gleet five months.	Prepuce long and narrow.	1	.....	Cure	.....	
120	58	Gon. 38 years previously.	1	Meatus.	28	32	Pain in penis and abdomen. Irritation at neck of bladder. Dribbling.	Prostate slightly enlarged and tender.	1	.....	Constant and great improvement.	One month after no recontraction.	

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.	Remarks
121	30	Gon. 15 years previously, and several times since.	3	Meatus. 2⅛ to 3⅛ in. 3¾ in.	20 28 39	40	Gleet		1		Cure		12 days after operation had a free hæm'ge. Controlled by perineal tourniquet.
122	25	Gon. several times.	3	Meat. & for ⅛ in. 2 in. 2⅛ in.	24 30 30	34	Gleet for one year.		1		Cessation of gleet. Still under observation.		
123		Gon. 6 years before and several times since.	2	Meatus. ¾ in. 3 in.	26 32 30	32	Frequent seminal emissions with great prostration. Dribbling.		1		Great improvement in three weeks.		Still under treatment.
124		Gon.	3	1 in. 2 in. 3⅛ in.	32 30 28	32			1		Cure	One year after no recontraction.	
125	34	Gon. 15 and 4 years previously.	2	Meatus. & ¾ in.		36	Gleet for 4 yrs. Pain in back. Gnawing sensations in hips & testes.		1		Lost sight of.		
126	47	Gon. 15 years previously.	2	Meatus. 3⅛ in.	30 36	38	Several attacks of cystitis following use of sounds. Incontinence when sound neglected. Dysuria.		1		Immediate cure of dysuria (five days).		Had been treated for Stricture "neck of bladder" by other surgeons.

127	26	Gon.	3	Meatus. 2 in. 2½ in.	24 30 30	34	Gleet for 1 yr. Dysuria. Frequent retentions following introduction of instruments. Stream sometimes small and again large. Daily retention for months without use of instruments.		1		Cured. No retention since 2d operation.		Had been treated for Stricture near the bladder by other surgeons. Meat. operated on 1st with relief to daily retention. Cure after 2d operation on Strictures at 2 and 2¾ 11 days later.
128	26	Gon.	2	Meatus. 4 in.	29 34	36	Gleet for 11 months.		1		Still under observation.		
129	22	Masturbation.	2	Meatus. 3¼ in.	25 30	35	Frequent seminal emissions. Alkaline urine with abundant phosphates.		1		Much improved. Still under observation.		Had been treated for Strict. at 6¾ in. by dilatation for past year.

The following cases were operated on at Charity Hospital, and reported by Dr. Meyer, House Surgeon.

130	40	Gon. 15 years ago.	6	Whole canal		34	Gleet. Frequent urination. Pain at end of urination. Small stream.		2	Urethral fever lasting 48 hours.	Cure after 2d operation.		Perineal sect. had been done but fistula refused to heal until after division of anterior Strict. Sound was passed into bladder at time of operation.
131	35	Gon.	3	Meatus. 3 in. 5 in.		34	Gleet for six months. Frequent urination for two months.		1	Urethral fever lasting 36 hours.	Cure		Sound was passed into bladder at time of operation.
132	37	Gon. several times.	3	Meatus. 3½ in.		34	Gleet. Frequent urination. Pain. Dysuria for 5 years.		1		Cure		

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.	Remarks.
133	20	Gon.	1	Meatus.		30	Gleet for three months.		1		Cure		
134	38	Gon.	2	Meatus. 3½ in.		32	Gleet five months. Frequent urination. Pain, etc., for two months.		1		Cure		
135	43	Gon.	2	To membranous portion.		38	Gleet for twelve years.	Chronic cystitis for 5 years. Chordee.	1		Cure of all except chronic chordee, which, however, was much improved by the operation.		
136	27	Gon.	2	Meatus. 4 in.		34	Gleet		1		Cure		

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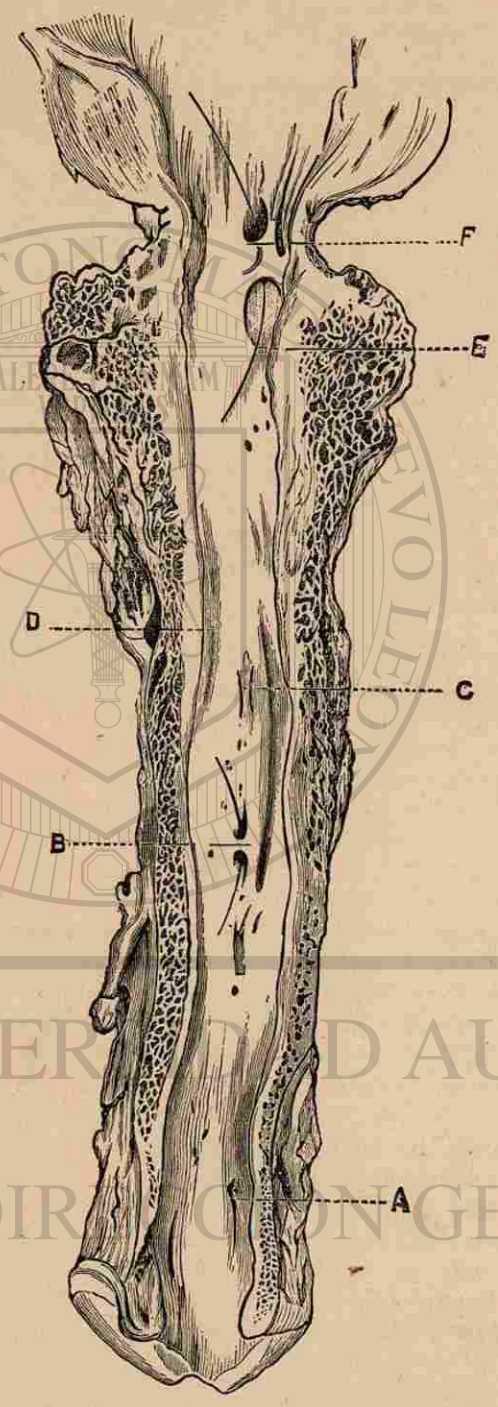

Radical cure of stricture demonstrated by appearances in a case of severe urethral stricture three years after operation by internal urethrotomy—Otis's method. Dr. Eldridge's case—see appendix, page 353, *et seq*.

APPENDIX.

I.—*A Case of Severe Urethral Stricture radically Cured by Internal Urethrotomy by Otis's Method.* By STUART ELDRIDGE, M.D., Surgeon of General Hospital of Yokohama, Japan; late Lecturer on Anatomy, Medical Department of Georgetown University, Washington, D. C.

W. L., a native of England, was admitted to the General Hospital of Yokohama, Japan, December 31, 1874, suffering from syphilitic rheumatism, urethral stricture, and urinary fistulæ. February 14, 1875, I joined the staff of the hospital, and found the man an inmate. The history of the case, so far as the stricture was concerned, was as follows: L. had suffered from stricture, the result of a severe clap, for some eight or nine years, during which time he had led a very dissipated life, and had repeated attacks of gonorrhœa. In the latter part of 1870, or the beginning of 1871, he had been operated upon by external perineal urethrotomy with temporary relief, but had almost entirely neglected the after-treatment of his case, only occasionally and at long intervals passing a very small catheter when retention occurred or seemed imminent. The fistulæ at present existing had followed upon an abscess *in perinæo* in the early part of 1874—the perineal opening of the abscess being shortly after followed by the formation of a second fistula near the root of the penis. The constitutional condition of the patient was such that I attempted no active measures until May, 1875, when the status of the patient was as follows: The urine was passed by the meatus in an intermittent and very small stream of perhaps one millimetre in diameter, by far the larger quantity flowing from two fistulous openings—one, the larger, nearly on the perineal raphe, midway between the scrotum and anus; the other, one centimetre to the left of the peno-scrotal

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junction. Both fistulæ seemed to diverge from a common sinus, though I was unable to pass an instrument into the urethra through either. To external manipulation the whole urethra was excessively knotted and indurated, the thickening and hardening being greatest in the proximal half of the penile portion. Examination of the urethra by bulb-sounds revealed a hard and insensitive stricture seven centimetres from the meatus, the contraction being seemingly about three centimetres in length, although, as with the most careful manipulation it would admit nothing larger than a bougie of four and one-half millimetres circumference, the determination of its proximal limit was uncertain. A false passage was detected, beginning a little more than two centimetres within the meatus, upon the right side of the urethral roof, and penetrating to a depth of five centimetres, this having probably resulted from rough or drunken attempts at catheterization, and the entanglement of the instrument in the fossa navicularis. The whole urethra anterior to the stricture was rough and nodular, while that portion of the mucous membrane nearest to the face of the contraction was distinctly sacculated at several points. May 18, 1875, after preparation by full doses of quinine for forty-eight hours, the patient was etherized, Dr. E. Massais assisting; the meatus, of which the calibre was fifteen millimetres circumference, was freely incised, and with great difficulty Holt's instrument, guarded by a Maisonneuve's conductor, was passed through the stricture, until firmly arrested about the bulbo-membranous junction. The instrument was then expanded to the utmost, although, from the fact that its point could not enter the bladder, the separation of that portion of the limbs which was engaged in the stricture was necessarily imperfect. Upon the withdrawal of the dilator, its conductor was found to have curled up in the urethra posterior to the just expanded stricture, and examination detected a second stricture, of about the same calibre as the first, about thirteen centimetres from the meatus, or in the lower bulbous portion. The Holt was then, with but little difficulty, passed into the bladder, and expanded, but only by the use of considerable force, to twenty-four millimetres circumference. A conical steel bougie, twenty and one-half millimetres circumference, was then passed with ease through the whole length of the urethra. As I had been unable to feel the sudden yielding caused by rupture, and as almost no hæmorrhage followed upon this double operation, I was inclined to think that

dilatation, not divulsion, had taken place, and had I been provided with a satisfactory instrument, I should have performed internal urethrotomy at once. No unpleasant symptoms followed the operation, and at the expiration of a week I was able to pass a bougie of sixteen millimetres circumference without difficulty, though recontraction to the extent of at least four millimetres of circumference had evidently occurred. The sixteen millimetre bougie was passed six times at intervals of a week, when, the fistulæ having healed, the patient was furnished with a bougie, No. 10, English, and, with most careful instructions as to the future use of the instrument, discharged from hospital.

September 6, 1875, L. was readmitted, suffering as before from syphilitic rheumatism, but plus an evidently cirrhotic liver, and with both casts and albumen in his urine. On inquiry it was found that he had been drinking freely, had suffered from an acute gonorrhœa during the month of August, had entirely neglected the use of the bougie, and that the stricture or strictures had recontracted until the urine at times passed only guttatim, and the fistulæ in the perinæum had partly reopened. Shortly after admission retention occurred, and after unavailing efforts to pass a catheter, made by my colleague, Dr. Massais, I aspirated above pubes, and a few hours later succeeded in passing a filiform flexible catheter. As about this time the urine began to pass freely by the fistula, catheterization was but a few times performed. Little attention was given to the stricture until the following December, when, suffering from excoriation and neuralgic pain, the patient begged for a second operation; to which with some reluctance I consented, and determined to perform internal urethrotomy, believing, as I do, that, under the circumstances of the case, this operation is little, if at all, more dangerous than repeated and probably useless attempts at gradual dilatation. The danger of any operation in his condition was fully explained to the patient, but he persisted in demanding relief. Twenty minims per diem of tr. ferri chloridi were administered for a week, and during the forty-eight hours preceding the operation one hundred grains of quinine were given. December 20, 1875, Dr. A. Goertz, of Yokohama, assisting, ether was administered, and an examination made showing that the anterior stricture had contracted to a circumference of seven and one-half millimetres, while the bulbar stricture would admit but a filiform whalebone guide. Holt's dilator having

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Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.	Remarks.
65	44	Gon. 16 years previously.	4	Meatus. 2 in. 4 in. 5 in.	15 21 15 5	32	Gleet. Urinates every one-half hour.	.....	1	1 chill. Slight hæmorrhage.	Cure	1 year after operation. No recontraction.	Deep Strict. divided by Maisonneuve's urethrotome.
66	25	Gon. 2½ years previously.	2	Meatus. 1 in. 2¾ in.	28 25 25	30	Gleet. Frequent and painful urination. Dribbling. Pain in hypogastrium, pubes, & legs. Involuntary movements of limbs. Pain at neck of bladder. Desire to urinate after evacuation of bowels, for one hour or more.	.....	2	Painful erections	All troubles except pubic pain disappeared in one week. Return of prostatic irritation. No return of Strictures or gleet.	.....	
67	30	7 years and also 9 mos. previously.	1	Meatus. to 3⅛ in.	25	34	Gleet. Uneasy sensation about genitals.	.....	2	.....	Improvement after each operation, final cure after 3 months.	6 months after first operation recontraction of Stricture at ½ inch to 28 f. Has painful erections. 2d operation cure.	

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.	Remarks.
68	31	Masturbation.	2	Meatus. 3½ in	25 29	32	Imperfect erection. Nocturnal seminal emissions.	.....	1	.....	2½ weeks after operation has perfect erections. Cure.	1 yr. and 8 mos. after no recontraction.	
69		Gon. 3 mos. previously.	2	Meatus. 1½ in.	16 28	34	Retention of urine. Gleet. Vesical tenesmus. No. 7 only passes in bladder.	Enlarged prostate.	1	.....	Cure	.....	
70	31	Gon. 9 years previously.	4	Meatus. 1½ in. 2½ in. 4½ in.	30 24 24 18	34	Gleet. Small and divided stream. Dribbling. Frequent and painful micturition.	.....	3	Slight incurvation of penis. Chills.	Cure complete	....	
71	24	Gon. 6 years and also 8 months previously.	1	Meatus. 2¾ in.	25 34	36	Transparent discharge.	.....	3	.....	Cure ..... Excess only causes return of gleet. 2d operation for deep Stricture. Still under treatment.	5 months after operation. No recontraction.	Meat. divided at 1st operation. About 2 yrs. after 1st operation returned for division of deep Stricture.
72	26	Gon. 6 years previously and several times since.	4	Meatus.	18 1½ 2 3½	36 not given	Gleet. Reflex pains over pubes and perineum.	.....	1	.....	Cure	.....	
73	16	No cause given.	1	Meatus.	22	34	Frequent and painful urination.	.....	2	.....	No improvement...	.....	

Number of case.	Age of Patient.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complications.	Number of Operations.	Accidents after Operation.	Result.	Re-examination.	Remarks.
74	26	No cause given.	1	Meatus.	22	32	Great difficulty of starting the act of urination. Frequent micturition.	.....	1	.....	Perfect cure	4 months after operation no recontraction.	
75	44	Gon. 6 years previously.	2	Meatus. 3 in.	30 30	35	Frequent and painful urination. Small stream. Pain in perineum, rectum and supra pubic region. Feeling of fullness in pelvis.	.....	1	.....	Never heard from ..	.....	Length of urethra ten inches.
76	27	Gon. one year previously.	1	Meatus.	29	34	Gleet. Dribbling after urination. Painful "tickling" sensation at glans penis.	.....	1	.....	Cure	4 months after operation no recontraction.	
77	37	Gon. 15 years previously.	1	Meatus.	28	34	Gleet. Frequent micturition.	.....	1	.....	Cure	5 months after operation no recontraction.	
78	60	Gon. about 6 months previously.	4	Meatus. Membranous portion 3 bands	28	34	Micturition prolonged.	Perineal abscess. Rectal fistula.	2	Hæmorrhage.	Cure	.....	The combined operation was performed.
79	38	Masturbation Excessive venereal indulgence.	2	Meatus. $2\frac{1}{2}$ in.	27 26	32	Imperfect erections. Premature emissions.	.....	1	.....	Lost sight of.....	.....	
80	32	Ulcers in urethra 3 years previously.	1	$1\frac{1}{2}$ in. to Meatus.	24	32	Gleet	Syphilis.	2	Hæmorrhage.	Cure	.....	
81	24	Gon. 5 years previously, and several times since.	1	Meatus.	31	36	Gleet 2 years. Vesical tenesmus.	Prostatic enlargement.	1	.....	Much improved....	4 months after operation. No recontraction.	
82	29	Gon. 12 years previously, and several times since.	3	Meatus. 3 in. $3\frac{3}{4}$ in.	30 30 30	38	Burning sensation in deep urethra. Gleet.	Prostatic enlargement.	3	.....	Discharge disappeared. Much improved generally.	....	
83	23	Gon. 6 mos. previously.	4	Meatus. $3\frac{1}{2}$ in. 3 bands	30 28	34	Gleet. Pain in glans penis, back and testicles. Frequent and painful micturition.	Cystitis.	1	.....	Cure after 3 months.	One year after operation continues well.	
84	25	Masturbation.	1	Meatus.	23	34	Dribbling after urination. Frequent seminal discharges. Imperfect erection. Premature emission. Despondency.	Long prepuce.	1	.....	Much improved.	....	Circumcision was also performed.

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.	Remarks.
85	35	Masturbation.	4	Meatus. 2⅔ in. 3 in. 4 in.	22 31 25 31	32	Frequent seminal emissions. Tremulous sensation in lower extremities. Imperfect erections. Dribbling. Persistent pain in hypogastric region aggravated by seminal emissions.	.....	1	.....	Cure	.....	.....
86	25	Gon. 10 mos. previously.	1	Meatus.	23	32	Gleet	.....	1	.....	Cure	.....	
87	26	Gon. 4 and 2 years previously.	1	⅓ in. from ½ in. to 3 in. Several bands.	28 31	32	Dribbles. Pain in back and lower extremities.	.....	2	Slight curvature of penis, disappeared in 1 month.	Cure	.....	
88	50	Gon.	2	Meatus. Close Strict at membranous urethra.		30	Dribbling. Frequent micturition. Gleet.	Perineal abscess.	1	.....	Cure	13 months after operation continues well.	Deep contraction divided by external division. No guide.
89	48	Gon. 20 and 18 years previously.	2	½ in. 4½ in.	18 21	30	Frequent micturition. Sense of obstruction at end of penis. Dribbling.	.....	2	.....	Cure	.....	The anterior contraction only was divided.
90	30	Gon. 3 and 2 years previously.	4	Meatus. ⅓ in. 2¾ in. 3 in.	29 27 29 29	34	Gleet. Discharge appeared 1½ year previously apparently without cause.	.....	1	.....	Improved. Recontraction found 3 months after operation.	3 months after, recontraction.	
91	60	Gon.	4	Meatus. 2 in. 2½ in. 3½ in.	32 32 32 32	36	Gleet. Irritability of bladder.	Slight enlargement of prostate. Cystitis.	1	.....	Cure perfect	One year after operation. No recontraction.	
92	31	Gon. 2 years previously.	5	Meatus. 1½ in. 2 in. 2⅞ in. 3¼ in.	25 30 30 26	32	Gleet. Sense of obstruction in urethra. Seminal weakness. Imperfect erections. Premature discharge. Hyperæsthesia of testicles. Atrophy of one testicle.	.....	1	Slight curvature of penis.	Cure	One year after perfectly well.	
93		Gon. 3 years also 3 mos. previously.	2	Meatus. 3 in.	28 26	32	Gleet. Pain in right hypogastric region and groin.	.....	1	.....	Pain disappeared after operation.	.....	
94	35	Gon. 12 years previously.	5	Meatus. from 1 to 2 in. 3 to 4 3 bands.	25 34 28	40	Gleet. Frequent attacks of retention requiring aspiration. Frequent micturition. Bladder habitually distended to umbilicus. Cannot retain urine when standing.	.....	2	.....	Cure of gleet. Relief for 10 mos. perfect. Volunt'y micturition every 4 hrs. Large stream immediately after operation and continued. 10 mos. after recontraction to 34 at Meat. and at 4 in. Return of frequent and difficult urination. No retention. 2d operation with immediate relief.	.....	Had been treated for deep Stricture by other surgeons. Two weeks later patient writes that troubles again threaten. Not since heard from.

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.	Remarks.
95	39	Gon. 18 and 10 years also one month previously.	1	Meatus.	25	34	Gleet (profuse). Prostatic tenderness. Irritability of neck of bladder. Straining and pain after urination.	Enlargement of right lobe of prostate	1	Diphtheritic deposit on wound.	Much improved.	2 months after operation no recontraction.	
96	40	Traumatic injury 17 yrs. and Gon. 4 yrs. previously and since.	1	Meatus.	14	32	Gleet. Sense of weight in perineum.	.....	1	.....	Much improved.	.....	
97	28	Gon. 11 and 7 years previously.	3	Meatus. 2 in. 3 in.	17 30	32	Gleet. Burning sensation in urethra after urination. Frequent micturition. Dribbling. Frequent seminal emissions. Imperfect erections. Severe pain in lumbar region. Pain in testicles and groin. Great depression of spirits with suicidal tendency.	Redundant prepuce.	1	.....	Much improved.	.....	Circumsion was also performed.
98	35	Gon. 16 years previously and several times since.	4	Meatus. $1\frac{1}{8}$ in. $3\frac{1}{4}$ in. $4\frac{1}{8}$ in.	15 25 11 36	36	Gleet. Divided stream.	.....	2	Slight hæmorrhage.	Recontraction. 2d operation 2 months later. Final cure.	.....	Marriage two months after 2d operation.
99		.....	2	Meatus. 3 in.	30 26	32	.....	.....	1	.....	Cure	1 yr. and 5 mos. after op'tion no recontraction.	
100	50	Masturbation Gon. 32 years previously.	2	Meatus to 1 in. 2 in.	25 30	35	Gleet. Griping pain above pubes after sexual intercourse.	.....	1	.....	Cure	6 months after operation no recontraction.	
101		Gon. 3 yrs. & $2\frac{1}{2}$ yrs. previously.	1	Meatus to $\frac{3}{4}$ in.	25	34	Gleet for $2\frac{1}{2}$ yrs. Severe pain at $\frac{1}{2}$ in. from Meat. tenes. and dribbling.	.....	1	.....	Relief in five days. Lost sight of.	.....	
102	29	Gon. $2\frac{1}{2}$ years ago.	1	Meatus to $\frac{1}{2}$ in.	26	32	Gleet for two years ...	.....	1	.....	Cure	.....	
103	18	Masturbation.	1	Meatus to 1 in.	26	32	Urination hesitating. Dribbles. Urethra very sensitive.	"Petit Mal," convulsion every day, or once a week. Unable to read.	3	.....	Immediate cure of urinary trouble. No attack of Petit Mal for 2 mos. Recontraction; operation. 3 mos. after reports only slight "faintings."	....	
104	21	Masturbation.	3	Meatus 3 in. $3\frac{1}{2}$ in.	26 31 31	34	Frequent seminal emissions. Dribbling.	....	1	.....	Great improvement.	.....	
105		Gon.	3				Retentions. In bed for yr. Frequent and difficult urination. Dilated for perineal Strict.	Calculus.	1	.....	Cure	.....	Dolbeau's operation. Calculus weighed $1\frac{1}{2}$ drachms.
106	28	Gon. several times.	4	Meatus. $2\frac{3}{4}$ in. $1\frac{1}{2}$ in. more or less for 3 inches	15 22 22	32	Gleet	.. ..	1	Urethral fever on 4 day after operation on passing sound into bladder.	Cure	.....	Gleet gave vaginitis to wife 4 days after marriage.

Number of case.	Age of Patient.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complications.	Number of Operations.	Accidents after Operation.	Result.	Re-examination.	Remarks.
107	4	Gon. 16 years ago, several times since.	1	Meatus.	23	37	Frequent urination every hour. Constant pain over pubes increased by holding urine.	Constriction of penis by prepuce.	4		Final complete relief. No apparent disposition to recontract.	.....	
108	21	Gon. 4 years previously.	4	Meatus. 4⅛ in. 3 in. 2½ in. 1 in.	28 28 26 26 26	34	Gleet. Frequent and painful urination and irritation at neck of bladder.	.....	1	Severe hæmorrhage.	Immediate relief to frequent urination and irritation.	....	
109	26	Gon.	1	Meatus. ¾ in.	23 23	35	Gleet for two years.	.....	1	.....	Much improved.	....	Had been treated for sub-pubic Stricture by other surgeons.
110	19	Masturbation Gon. severe.	4	Meatus. 2½ in. 3½ in. 4 in.	20 24 28 30	35	Gleet. Frequent and painful urination.	Constant pain in rectum and sacrum.	1	Urethral fever.	Relief to pain, but gleet continues. Still under treatment.		
111	35	Gon. 6 years previously.	3	From 2 to 3 in.	28	34	Occasional gleet. Frequent urination (every 2 hrs. in warm weather and every hr. in cold) Intense pain over pubes at neck of bladder and end of penis.	.....	1	See Remarks.	Immediate relief to pain, etc.	.....	Strictures were divided by the examination which was the only operation. Profuse bleeding followed. Sounds to 34 f. only were used.
112	33	Masturbation Excessive venery.	5	Meatus. 2 in. 2½ in. 3 in. 4¾ in.	28 30 26 26 28	32	Involuntary and premature emissions.	.....	1	Hæmorrhage.	Urethritis following neglect and exposure at night.	Recontraction.	
113	31	Congenital.	2	Meatus. 1½ in.	30 36	39	Frequent and painful urination every 15 or 20 minutes.	.....	1	.....	Immediate relief. Cure.	.....	
114	36	Gon. 20 and 18 years previously. "Abortive" injections.	6	Meatus. ½ in. 2½ in. 3 in. 4 in. 4¼ in.	18 20 20 20 18 18	34	Gleet for 18 years.	Redundant prepuce with phymosis.	1	.....	Cure. One month after operation writes that he is perfectly well.	.....	Operation of circumcision and division of Meatus done first.
115		....	1	Meatus.	20	38	Intense pain in urethra and at neck of bladder.	.....	2	.....	Immediate relief for four mo. Recontraction. 2d operation with complete relief	.....	
116	25	Masturbation.	1	1 in.	25	32	Frequent urination. Difficulty in starting urine. Dribbling very marked.	Pains at end of spine, in penis and perineum and down legs.	1	.....	Much improved. Passed from observation.	.....	
117		Gon.	3	Meatus. 1 in. 3½ in.	18 20 30	36	Gleet four months.	Frostate tender and swollen.	1	.....	Relief to prostate in 6 days. No record further.	....	
118		See No. 71.		.....			.....	.....		.....	.....	.....	
119	20	Gon.	3	Meatus. ⅞ in. 3½ in.	18 20 30	34	Gleet five months.	Prepuce long and narrow.	1	.....	Cure	.....	
120	58	Gon. 38 years previously.	1	Meatus.	28	32	Pain in penis and abdomen. Irritation at neck of bladder. Dribbling.	Prostate slightly enlarged and tender.	1	.....	Constant and great improvement.	One month after no recontraction.	

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.	Remarks
121	30	Gon. 15 years previously, and several times since.	3	Meatus. 2⅛ to 3⅛ in. 3¾ in.	20 28 39	40	Gleet		1		Cure		12 days after operation had a free hæm'ge. Controlled by perineal tourniquet.
122	25	Gon. several times.	3	Meat. & for ⅛ in. 2 in. 2⅛ in.	24 30 30	34	Gleet for one year.		1		Cessation of gleet. Still under observation.		
123		Gon. 6 years before and several times since.	2	Meatus. ¾ in. 3 in.	26 32 30	32	Frequent seminal emissions with great prostration. Dribbling.		1		Great improvement in three weeks.		Still under treatment.
124		Gon.	3	1 in. 2 in. 3⅛ in.	32 30 28	32			1		Cure	One year after no recontraction.	
125	34	Gon. 15 and 4 years previously.	2	Meatus. & ¾ in.		36	Gleet for 4 yrs. Pain in back. Gnawing sensations in hips & testes.		1		Lost sight of.		
126	47	Gon. 15 years previously.	2	Meatus. 3⅛ in.	30 36	38	Several attacks of cystitis following use of sounds. Incontinence when sound neglected. Dysuria.		1		Immediate cure of dysuria (five days).		Had been treated for Stricture "neck of bladder" by other surgeons.

127	26	Gon.	3	Meatus. 2 in. 2½ in.	24 30 30	34	Gleet for 1 yr. Dysuria. Frequent retentions following introduction of instruments. Stream sometimes small and again large. Daily retention for months without use of instruments.		1		Cured. No retention since 2d operation.		Had been treated for Stricture near the bladder by other surgeons. Meat. operated on 1st with relief to daily retention. Cure after 2d operation on Strictures at 2 and 2¾ 11 days later.
128	26	Gon.	2	Meatus. 4 in.	29 34	36	Gleet for 11 months.		1		Still under observation.		
129	22	Masturbation.	2	Meatus. 3¼ in.	25 30	35	Frequent seminal emissions. Alkaline urine with abundant phosphates.		1		Much improved. Still under observation.		Had been treated for Strict. at 6¾ in. by dilatation for past year.

The following cases were operated on at Charity Hospital, and reported by Dr. Meyer, House Surgeon.

130	40	Gon. 15 years ago.	6	Whole canal		34	Gleet. Frequent urination. Pain at end of urination. Small stream.		2	Urethral fever lasting 48 hours.	Cure after 2d operation.		Perineal sect. had been done but fistula refused to heal until after division of anterior Strict. Sound was passed into bladder at time of operation.
131	35	Gon.	3	Meatus. 3 in. 5 in.		34	Gleet for six months. Frequent urination for two months.		1	Urethral fever lasting 36 hours.	Cure		Sound was passed into bladder at time of operation.
132	37	Gon. several times.	3	Meatus. 3½ in.		34	Gleet. Frequent urination. Pain. Dysuria for 5 years.		1		Cure		

Number of Case.	Age.	Cause and Date of.	Number of Strictures.	Locality of Stricture.	Size of Stricture.	Norm. Calibre of Urethra.	Condition at Date of Operation.	Complication.	Number of Operations.	Accidents after Operation.	Results.	Re-examination.	Remarks.
133	20	Gon.	1	Meatus.		30	Gleet for three months.		1		Cure		
134	38	Gon.	2	Meatus. 3½ in.		32	Gleet five months. Frequent urination. Pain, etc., for two months.		1		Cure		
135	43	Gon.	2	To membranous portion.		38	Gleet for twelve years.	Chronic cystitis for 5 years. Chordee.	1		Cure of all except chronic chordee, which, however, was much improved by the operation.		
136	27	Gon.	2	Meatus. 4 in.		34	Gleet		1		Cure		

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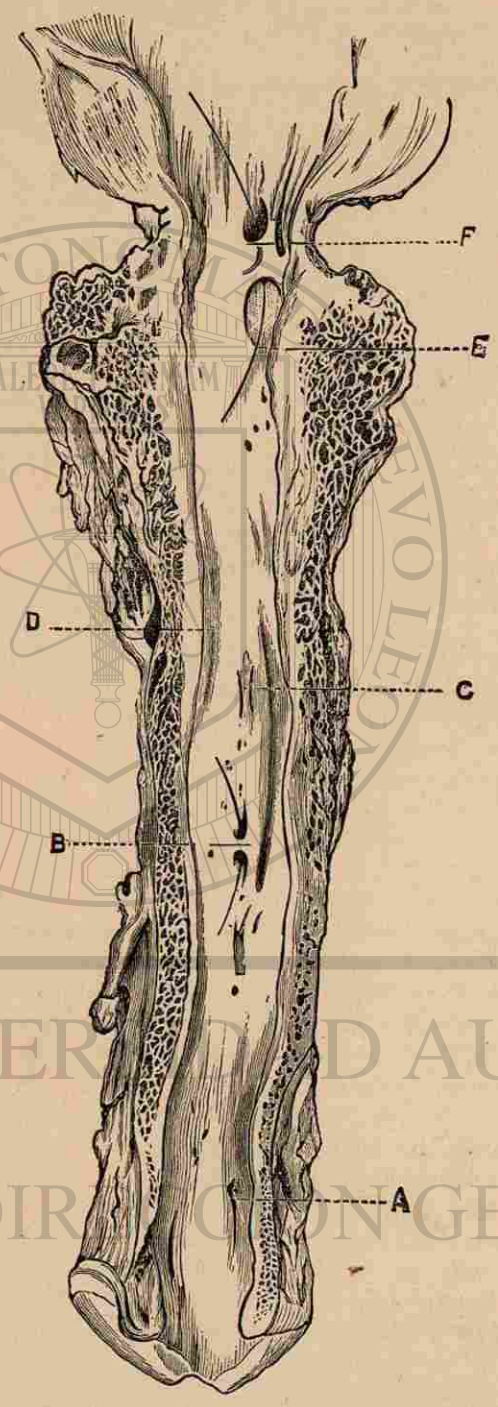

Radical cure of stricture demonstrated by appearances in a case of severe urethral stricture three years after operation by internal urethrotomy—Otis's method. Dr. Eldridge's case—see appendix, page 353, *et seq*.

APPENDIX.

I.—*A Case of Severe Urethral Stricture radically Cured by Internal Urethrotomy by Otis's Method.* By STUART ELDRIDGE, M.D., Surgeon of General Hospital of Yokohama, Japan; late Lecturer on Anatomy, Medical Department of Georgetown University, Washington, D. C.

W. L., a native of England, was admitted to the General Hospital of Yokohama, Japan, December 31, 1874, suffering from syphilitic rheumatism, urethral stricture, and urinary fistulæ. February 14, 1875, I joined the staff of the hospital, and found the man an inmate. The history of the case, so far as the stricture was concerned, was as follows: L. had suffered from stricture, the result of a severe clap, for some eight or nine years, during which time he had led a very dissipated life, and had repeated attacks of gonorrhœa. In the latter part of 1870, or the beginning of 1871, he had been operated upon by external perineal urethrotomy with temporary relief, but had almost entirely neglected the after-treatment of his case, only occasionally and at long intervals passing a very small catheter when retention occurred or seemed imminent. The fistulæ at present existing had followed upon an abscess *in perinæo* in the early part of 1874—the perineal opening of the abscess being shortly after followed by the formation of a second fistula near the root of the penis. The constitutional condition of the patient was such that I attempted no active measures until May, 1875, when the status of the patient was as follows: The urine was passed by the meatus in an intermittent and very small stream of perhaps one millimetre in diameter, by far the larger quantity flowing from two fistulous openings—one, the larger, nearly on the perineal raphe, midway between the scrotum and anus; the other, one centimetre to the left of the peno-scrotal

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junction. Both fistulæ seemed to diverge from a common sinus, though I was unable to pass an instrument into the urethra through either. To external manipulation the whole urethra was excessively knotted and indurated, the thickening and hardening being greatest in the proximal half of the penile portion. Examination of the urethra by bulb-sounds revealed a hard and insensitive stricture seven centimetres from the meatus, the contraction being seemingly about three centimetres in length, although, as with the most careful manipulation it would admit nothing larger than a bougie of four and one-half millimetres circumference, the determination of its proximal limit was uncertain. A false passage was detected, beginning a little more than two centimetres within the meatus, upon the right side of the urethral roof, and penetrating to a depth of five centimetres, this having probably resulted from rough or drunken attempts at catheterization, and the entanglement of the instrument in the fossa navicularis. The whole urethra anterior to the stricture was rough and nodular, while that portion of the mucous membrane nearest to the face of the contraction was distinctly sacculated at several points. May 18, 1875, after preparation by full doses of quinine for forty-eight hours, the patient was etherized, Dr. E. Massais assisting; the meatus, of which the calibre was fifteen millimetres circumference, was freely incised, and with great difficulty Holt's instrument, guarded by a Maisonneuve's conductor, was passed through the stricture, until firmly arrested about the bulbo-membranous junction. The instrument was then expanded to the utmost, although, from the fact that its point could not enter the bladder, the separation of that portion of the limbs which was engaged in the stricture was necessarily imperfect. Upon the withdrawal of the dilator, its conductor was found to have curled up in the urethra posterior to the just expanded stricture, and examination detected a second stricture, of about the same calibre as the first, about thirteen centimetres from the meatus, or in the lower bulbous portion. The Holt was then, with but little difficulty, passed into the bladder, and expanded, but only by the use of considerable force, to twenty-four millimetres circumference. A conical steel bougie, twenty and one-half millimetres circumference, was then passed with ease through the whole length of the urethra. As I had been unable to feel the sudden yielding caused by rupture, and as almost no hæmorrhage followed upon this double operation, I was inclined to think that

dilatation, not divulsion, had taken place, and had I been provided with a satisfactory instrument, I should have performed internal urethrotomy at once. No unpleasant symptoms followed the operation, and at the expiration of a week I was able to pass a bougie of sixteen millimetres circumference without difficulty, though recontraction to the extent of at least four millimetres of circumference had evidently occurred. The sixteen millimetre bougie was passed six times at intervals of a week, when, the fistulæ having healed, the patient was furnished with a bougie, No. 10, English, and, with most careful instructions as to the future use of the instrument, discharged from hospital.

September 6, 1875, L. was readmitted, suffering as before from syphilitic rheumatism, but plus an evidently cirrhotic liver, and with both casts and albumen in his urine. On inquiry it was found that he had been drinking freely, had suffered from an acute gonorrhœa during the month of August, had entirely neglected the use of the bougie, and that the stricture or strictures had recontracted until the urine at times passed only guttatim, and the fistulæ in the perinæum had partly reopened. Shortly after admission retention occurred, and after unavailing efforts to pass a catheter, made by my colleague, Dr. Massais, I aspirated above pubes, and a few hours later succeeded in passing a filiform flexible catheter. As about this time the urine began to pass freely by the fistula, catheterization was but a few times performed. Little attention was given to the stricture until the following December, when, suffering from excoriation and neuralgic pain, the patient begged for a second operation; to which with some reluctance I consented, and determined to perform internal urethrotomy, believing, as I do, that, under the circumstances of the case, this operation is little, if at all, more dangerous than repeated and probably useless attempts at gradual dilatation. The danger of any operation in his condition was fully explained to the patient, but he persisted in demanding relief. Twenty minims per diem of tr. ferri chloridi were administered for a week, and during the forty-eight hours preceding the operation one hundred grains of quinine were given. December 20, 1875, Dr. A. Goertz, of Yokohama, assisting, ether was administered, and an examination made showing that the anterior stricture had contracted to a circumference of seven and one-half millimetres, while the bulbar stricture would admit but a filiform whalebone guide. Holt's dilator having

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by cicatricial tissue were only distinguishable as such by their superior smoothness, and the apparent absence of glandular structure when examined *in situ* under a low power. At the former location of the bulbar stricture I was entirely unable to identify the scars either of the old external operation or of the later internal incision. The bridges of tissue constituting the false passages, B and F, seemed equally soft and elastic with the rest of the mucous membrane, and certainly did not in the least diminish the urethral calibre. I should say that the evidence as to external perineal urethrotomy having been performed is solely the statement of the patient, as the asserted locality of the cicatrix of that operation was involved in opening of the perineal fistulæ. I see, however, no reason to doubt that such an operation had been performed.

The case, taken in all its bearings, seems to go far toward proving the permanent curability of urethral stricture, even under most unfavorable circumstances, providing that a free incision of the contractions is made, and kept open for a very short time. Considering the facts as above stated—a double, tight, cartilaginous stricture, exceedingly resilient, as shown by the failure to divulge and by its speedy return after large distention, to which were added the traumatic complication of a previous perineal section, the bad general health and habits of the patient, together with the trifling amount of treatment given after the internal urethrotomy of December 20, 1875—it is evident that if, under such circumstances, so nearly perfect a result is to be attained by intelligent urethrotomy, the problem of the permanent cure of stricture may be deemed as solved.

Lest it may be suggested that the contractions in this case may have been the supposititious syphilitic stricture, I would state that the stricture and fistulæ antedated the syphilitic contagion by several years, and that consequently the anti-syphilitic treatment which the patient received could hardly be thought to have in any way affected the urethral constriction.

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