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			Total.... 100
33	"	"	"	3			
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;

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

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.

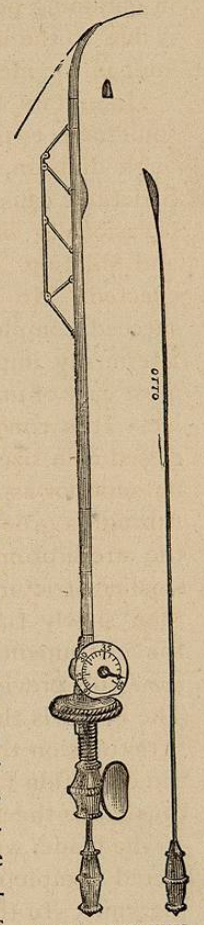
It will be seen from these statistics that the results of treatment justify in the completest manner all that has been heretofore claimed by me for the method. In point of gravity it will be seen that cutting operations for the division of Stricture in the pendulous portion of the urethra (where the 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

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.

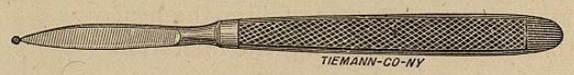
For a second operation, I not unfrequently use one of my earlier urethrotomes,* which cut only at a single predetermined point, and the blades of which are not protected by a guard. In all these instruments the incisions are comparatively slight. The tension to which the Strictures are subjected renders 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

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.

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	½ 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.	--	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. 3¼ 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. 4½ 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	⅓ 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	⅓ 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	½ 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.