the urine of the patient. In all such cases—and I have seen many—I am confident it will be found that the patients are or have been habitual masturbators, and that the disease has been ingrafted upon a diseased mucous membrane previously deteriorated by this practice. These are bad cases to manage, especially if, as sometimes occurs, the vicious practice is still kept up.

LESSON XLIX.

CYSTITIS.

Gonorrhœal cystitis rarely occurring before the third or fourth week of the disease—When occurring earlier usually the result of injections or instrumental interferance — Other causes — Symptoms of cystitis—Treatment—Stricture of the urethra as a cause of cystitis—Clinical case in illustration—Prompt relief of threatened cystitis by division of stricture—Permanence of cure—Necessity of examination for stricture in cases of threatened or present cystitis—Importance of confining examination to the anterior or straight portion of the urethra—Exploration beyond the bulbous portion in such cases always perilous, and, as a rule, to be avoided.

An occasional complication of gonorrhœa, is the extension of the disease to the bladder. This rarely occurs before the third or fourth week, from gradual extension of the inflammation along the urethra. Its occurrence, however, is not infrequent through the use of injections.

Even the forcible injection of warm water has been known to engraft a cystitis upon a recent gonorrhœal inflammation. It is, however, in the later stages of a gonorrhœa, when the disease has crept back in a mild form into the deeper urethra, that from some especially provoking cause the inflammation is suddenly increased, and involves the mucous membrane of the vesical neck. The effort to drive injections back into the deeper urethra in the later stages of gonorrhœa, not unfrequently, results in their entrance into the prostatic urethra and the bladder, unless care is taken to prevent it. Hence the occasional occurrence of irritation causing frequent and painful urination in the later stages of gonorrhœa. Quite frequently indulgence in sexual contact, with or without connection, especially if combined with alcoholic excess, will cause a sudden aggravation of the urethral inflammation and its extension to the bladder. Passage of urethral instruments into the

bladder in examining for stricture, is a frequent cause of setting up inflammation of the vesical neck.

The symptoms are frequent urination and painful spasmodic contractions of the vesical sphincter. The amount of urine is small and at the close of the act of urination often mixed with blood. No sense of relief following. Great nervous irritability usually resulting; rarely any constitutional disturbance. Inflammatory disease occasionally extending beyond the vicinity of the vesical neck, may involve the entire mucous coat of the bladder, and even extend up the ureters and into the pelvis of the kidney.

Treatment requires absolute rest, in the first place. Suppositories of morphia, ¼ grain, every four or six hours, to quiet spasms and pain. Diuretics, demulcents, and diluents as in the acute stage of gonorrhœa, are serviceable. Infusion of the dried root of Triticum Repens or "dog grass," an ounce and a half to the pint of boiling water and adding to this a drachm of the bromide of potassium makes an excellent sedative and demulcent drink, the whole amount to be taken during each day as long as required. Any attempt to wash out the bladder would be sure to aggravate the disease during the acute stage and as long as pain is present. Injections of all sorts, medicated or otherwise, are contra-indicated. Warm water injections into the rectum are sometimes serviceable, adding a few drops of laudanum to each. When the acute stage has passed, and there is no longer any pain during or following micturition, and yet pus from the bladder is still found in the urine, occasional injections of the muriated tincture of iron, 20 drops to 4 ounces of water, at bed-time, are often serviceable. Gonorrhœal cystitis is occasionally caused by the added irritation caused by stricture at some point in the course of the urethra, and this, too, when the calibre of the urethra is only slightly reduced. The following case, illustrates the effect of this in producing a cystitis, and also the prompt benefit accruing from the removal of the stricture:

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 3¾ 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 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 apparantly 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 twentyfour 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 re-examination 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 slighest 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 were still found. There were also a few hyaline casts, but the case appears to me to prove fully the possible influence of strictures of large calibre 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 April, 1883, 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 then gave not the slightest evidence of re-contraction at the site of former strictures.

LESSON L.

URETHRAL STRICTURE.

Urethral stricture a frequent complication of gonorrhœa—Description of the urethra—Its uses—Necessity for complete freedom from obstruction—Constrictions from various causes—Usually the result of previous inflammatory action—Manner in which stricture is formed—True stricture always surrounds the urethra—Spasmodic stricture—Distinction between organic and spasmodic stricture—Causes of organic stricture—Congenital narrowings—Usually at or near the urethral orifice—Measurement in one hundred cases of supposed normal urethræ—Highest type of urethral orifice that which corresponds in size with the urethra behind it—Reasons for this statement—Lithiasis a cause of urethral stricture—Reasons for this—Usual locality of such strictures—Clinical case in illustration—Sir Henry Thompson's views in confirmation of the capacity of vitiated urinary secretions to cause urethral stricture—Sir Benjamin Brodie's and Mr. Listers' views confirming the same.

In examination for stricture in cases of threatened or present cystitis, where stricture is a suspected cause of originating or aggravating the trouble, it should be borne in mind that such stricture if present is rarely beyond the bulbo-membranous junction and almost never beyond the membranous urethra, and also it should be understood that a contracted urethral orifice constitutes a stricture as potent for keeping up bladder troubles as when situated at a deeper point in the urethra. In all examinations entrance into the bladder or even beyond the bulbous urethra, as a rule, *should be avoided.*

One of the most common as well as the most important of all the complications of gonorrhœa is

STRICTURE OF THE URETHRA.

The urethra may be described as an appendage of the urinary bladder and of the vesiculæ seminales; its office, in connection with the vesiculæ seminales, being simply to convey the spermatic fluid, and, in its connection with the urinary bladder, to convey the urine from that reservoir to a proper and convenient distance. It is provided with no especial organic structure, except that which is required for the complete performance of its office as a common carrier. To facilitate the passage of the urine, a propelling power of no insignificant character is furnished by the muscular strength of the bladder, aided by those of the abdominal parietes and the diaphragm. As the urinary fluid is an excretion, irritating in its nature, its immediate and complete discharge from the urethra becomes a necessity; hence this canal is furnished throughout its entire length with a resilient muscular surrounding, which, in its normal condition, effects this purpose with certainty and completeness. In order, therefore, that the fluids which find their exit from the body by the urethra, shall pass through it with the least possible friction, the chief mechanical necessity in its formation is complete freedom from obstruction. Any obstruction, therefore, from any cause—congenital or acquired—must, of necessity, be considered an interference, to a greater or a less degree, with the functional perfection of the genito-urinary apparatus. Constrictions of the urethral canal, from various causes, and at various points, are known to occur, and vary from slight interference with its muscular surroundings to virtual obliteration of the canal.

Congenital narrowings of the urethral orifice are perhaps as common as congenital phimosis; but this point is so much in the line of inflammatory action, from infantile balanitis and irritations from other causes, that it is quite impossible to draw the line, in any case, between the congenital and the acquired condition. Other than at this point, there is, I believe, no record of congenital urethral stricture. Strictures, at all other points, are recognized as of inflammatory origin. Any inflammation, set up by any cause, which dips below the mucous membrane lining the urethra, occasions, of necessity, an aggregation of plastic connective-tissue material, which, becoming organized in the submucous structure, is at once established as a point of obstruction in the normal urethral canal, and, when surrounding it (either by interference with the muscular resiliency of its walls, or by contraction of its lumen), this is elevated into the importance of a true urethral stricture.

Stricture tissue is simply cicatrical material, de-

posited in accordance with the accepted pathological law, that persistent irritation of living tissue results in the aggregation of germinal cells, and the development of connective tissue corpuscles, at the point of irritation. These, becoming organized in the submucous cellular tissue and the adjacent muscular structure of the corpus spongiosum, result 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 or the other, 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. 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.

This is known as *true organic* stricture, in order to distinguish it from so-called *spasmodic* stricture, which is always due to a more or less complete closure of the urethra at various points through a spasmodic contraction of the muscular surroundings of the canal, and is chiefly met with in the so-called muscular or membranous portion of the urethra, between the anterior and posterior layers or walls of the triangular ligament.

In order to make the distinction between the organic and the spasmodic varieties of urethral contraction more prominent, and to avoid even the possibility of confounding the spasmodic difficulty, either theoretically or in practice with true organic stricture, the term *urethrismus* has heretofore been employed by me during public discussions on its nature and importance, and now I believe pretty generally adopted by later writers.

STRICTURE, that is, always meaning *organic stricture*, is due to various causes:

1. Congenital narrowings (which are practically strictures, and which are found, in or near the urethral orifice).
2. Lithiasis.
3. Masturbation.
4. Traumatism.
5. Gonorrhœal inflammation.

1. In regard to congenital narrowings, these have heretofore been accepted as normal when they did not infringe upon the capacity of the orifice sufficiently to produce marked difficulty in urination. In the examination of one hundred living subjects with the urethrametre—

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	"			
17	were	25	"			
100						24.72

Average size in one hundred cases, 24.72.

In no case was the urethra, in the one hundred cases, below a calibre of 26 millimeters—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 diminitive 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. The 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.

We can, then, only accept the urethral orifice as absolutely free from contraction—practically *stricture*—when it completely corresponds and in size with the normal urethra behind it. The question of surgical interference must always be determined by the presenting difficulties, direct or reflex, which may, in the light of what is now known of the possible influence of such contractions, be reasonably attributed to it.

2. In regard to *lithiasis*, or the habitual tendency to the deposit of crystalline material of the urine at a higher temperature than that of the blood. The so-called "uric acid discrasia," for instance, the habitual passage of uric acid crystals, commonly known as the "*red pepper sediment*," or the "*brick-dust deposit*," is well known to be frequently associated with an irritable urethra bleeding easily under the slightest examination, and presenting exceedingly sensitive points, especially when the urethra is naturally thrown into transverse folds, as at the peno-scrotal angle. It is also known that in a very great majority of persons two or three slight contractions of the urethra are present in the same locality, where there has been no acute inflammation caused to which such contractions may be attributed; and furthermore, it is a well recognized fact that on the accession of inflammatory urethra trouble from other causes, these points are usually the first to receive accessions of plastic material, which result in well-marked urethral stricture. In making my measurements of 100 cases of supposed normal urethral with the urethra-metre in 1875, 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 bulbous with the membranous urethra. These were at a point where the mucous

* See Otis on "Stricture of the Male Urethra: Its Radical Cure." Putnam's Sons, 2d ed., 1882, page 200, et seq.

membrane would naturally fall into transverse folds, in the pendant 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 on subsequent examination of the same organ in flaccid condition with the urethra-meter, 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 will cite the case of a lad of nineteen years, who gave positive assurance that he never 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 was presented at my college clinic. Examination resulted in the discovery of a vesical calculus measuring 1¼ inches in its long, ⅜ of an inch in it 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 (uric acid), 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, of several years' duration in connection with the arrangement of the 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.

Sir Henry Thompson, 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), "Excesses of venery, protracted erections, and prolonged intercourse, are recognized causes of stricture." Lallemand, Ricord, Sir Everard Home, Acton, Gouley, Gross, and others, recognized *masturbation* as a cause of urethral stricture, and certainly if we can accept, with Sir Henry Thompson, excesses 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 undoubtedly causes of spasmodic stricture; these diatheses, therefore, predispose in this manner to the accession of organic stricture."