The teaching of anatomy must be systematic, must be begun at the commencement of the medical studies and continued until their end. The student must begin by learning the anatomy of the cell, and must be able to follow it through all its changes up to the formation of the most intricate tissues. To accomplish this it will be necessary to institute a distinct course of microscopic anatomy in which he will learn the beautiful wonders of the growth of tissue from that simplest anatomic element, the primeval cell. Next he should be taught development from the moment of impregnation to the time of birth. If these two branches of anatomy were carefully and systematically taught, the student would indeed be dull who did not have an active desire to pursue his studies further. Next he should attend a regular course of didactic lectures in which his teacher should aim to use the cadaver and actual preparations as much as possible, as by so doing he would teach the student to recognize the actual structures and not pictorial likenesses thereof. *Pari passu*, with this didactic course he should be taught practical anatomy, but before he is allowed to dissect he should be carefully taken over the bones of the skeleton, having each and every one of them thoroughly demonstrated to him, both from a mechanical and from a physiologic point of view, and in this way be able to understandingly view the skeleton, both in its integral parts and as a whole. He is now ready to enter the dissecting room where he should be made to dissect the body at least three times. His first dissection should be a topographical one, in which he should learn not only the individual parts, but the parts in relation to each other.

His second dissection should be a repetition of the first, with the addition that the teacher should constantly draw the student's attention to the importance of the various structures in their relation to the practice of surgery and medicine.

His third dissection should be one confined to medical and surgical anatomy, when he should perform all the surgical operations and learn to recognize all the tissues concerned therein, and during which he should be further taught the surface markings of all the important viscera. By such a course as this, I believe that the subject could be thoroughly mastered.

I would further suggest that the method of examination should be changed and that a series of examinations should be held, arranged in such a way that the teacher could be sure that his pupil had mastered what he had already gone over before he was allowed to proceed further. This would do away with cramming, would stimulate systematic work and would insure sound knowledge.

It is true that such a course as that which I have laid out would take time, but what of that? The day has passed when the intelligent teacher believes in the remotest degree that a two or a three years' course can be sufficient for a medical education, and the four years' curriculum is being rapidly introduced, while there are still many who like myself, believe that six years should be the minimum time of study for a medical degree.

In closing, let me affirm that no man who will follow out the course which I have here laid down will ever have reason to regret it.

If a surgeon, he will have that *sans froid* and confidence which is begotten of knowledge, that knowl-

edge which is not to be obtained from books and lectures alone or in preponderance, but which is only acquired by long work in the dissecting room. He will not only know the position and relation of parts, but he will have the *tactus eruditus* which carries to the mind an appreciation of tissues and which Treves, so well names, "the anatomy of the individual." His dissections will have further trained him for his future operative work, for surgery is largely a handicraft. He will be self-possessed, cool, ready in any emergency, will know what he wants to do and will never suffer from "surgical panic," for he knows, and knowing fears not.

STRICTURE OF THE MALE URETHRA.

Read in the Section on Surgery and Anatomy, at the Forty-fifth Annual Meeting of the American Medical Association, held at San Francisco, June 5-8, 1894.

BY MILLARD H. CRAWFORD, M.D.

SURGEON U. S. NAVY, SAN FRANCISCO, CAL.

Stricture is that condition where there is an abnormal diminution of the caliber of the canal, induced by pathologic changes in the mucous or submucous muscular walls of the urethra.

Strictures may be divided into inflammatory, true or organic stricture and false or spasmodic stricture, and divided according to their form into linear, annular, indurated, irregular or tortuous strictures. Some surgical authorities make another division according to the condition that exists; for instance when the stricture bleeds easily by use of instruments or becomes inflamed it is called an irritable stricture. Then again they may be divided into small caliber, which will admit only of the smallest size sounds, less in circumference than fifteen millimeters, and of a large caliber, or strictures that will take instruments from that size upward.

A spasmodic stricture is that condition where there is muscular spasm and the normal caliber of the urethra is diminished.

It is a question which all surgical authorities have not fully agreed upon, whether spasm of the urethra takes place without the presence of some organic constriction of prior existence. Sir B. Brodie says: "That a spasmodic stricture may exist independently of any actual organic disease. At the same time it must be acknowledged that the existence of a purely spasmodic stricture is of rare occurrence."

John Hunter states: "There are often spasmodic contractions of these muscular fibers in different parts of the canal, shutting up the passage and obstructing the course of the canal, and often not allowing a drop to pass."

I think it has been proved beyond a doubt that the whole urethra has contractile action, and with a sphincteric muscle which acts especially on one part of it may cause temporary constriction. I will briefly mention the chief causes of spasmodic stricture. Where an organic stricture already exists, this spasmodic constriction may be caused by extreme acidity and irritating effects of the urine. Turpentine, cantharides, spices have the same effects. Hemorrhoids, rectal fistulæ and operations about the anus are frequently followed by retention from spasmodic contractions of the muscle. Strong mental emotions will interfere sometimes with micturition.

ETIOLOGY OF STRICTURE OF THE MALE URETHRA.

I believe that the majority of surgeons agree with Sir Astley Cooper, who says: "That in ninety-nine cases out of every hundred it was the result of an attack of gonorrhea."

Civiale says: "That gonorrhea might be placed in the first rank of the list of causes of stricture. He then asserts that this affection may never have been acute, but chronic at its commencement, and not necessarily following impure or even indeed any sexual connection."

He enumerates other and less obvious causes, such as abuse of instruments employed in affections of the urethra, perineal section and abuse of coitus and prolonged erections.

Sir Henry Thompson gives the analysis of 202 cases of the stricture of the urethra. Of this number 81 per cent. was caused by gonorrheal inflammation; 14 per cent. due to injuries of the perineum; four cases due to cicatrization of chancres, and six cases to congenital origin.

Dr. Otis gives the record of 85 cases of stricture, representing 147 distinct strictures of the urethra:

75	or	88.23	per cent.	were due to	gonorrhea
5	or	5.88	per cent.	were due to	masturbation
3	or	3.53	per cent.	were due to	lithiasis
2	or	2.35	per cent.	were due to	traumatic.

My experience is where an attack of gonorrhea has existed for some time, it is more apt to cause stricture than a slight attack of but brief duration.

Any injuries to the perineum from a fall or a blow may cause stricture.

The use of strong injections, a sudden rupture of the walls of the urethra during an attack of chordee might result in causing a stricture, or rough and awkward use of sounds and catheters. The location of a stricture of the urethra varies extensively, but I think most authorities agree in finding it most frequently in the subpubic curvature which occupies an inch of the urethra before, and three-quarters of an inch posteriorly, which includes all of the membranous portion. The next place in frequency is about two inches and a half of the first portion of the urethra. The seat of the third most frequent location is about two inches and a half to three inches of the center of the spongy portion of the urethra, or within two inches and a half of the external meatus.

According to the eminent authority of Sir Henry Thompson who made a careful examination of over three hundred preparations of strictures contained in the museums of Paris, London and Edinburgh, he found that out of 320 distinct strictures, 216 cases, or 67 per cent., in the subpubic curvature; 51 cases, or 16 per cent., in the center of the spongy portion; 54 cases, or 17 per cent., at the external meatus, including a distance of two inches and a half behind it.

Stricture in the prostatic portions is extremely rare unless there exists hypertrophy of the prostate gland.

Symptomatology.—The first symptoms that usually causes a patient to consult a surgeon for treatment of stricture is a slight gleet discharge.

Some irritation is felt or slight smarting sensation in the tract of the urethra during the act of micturition; there is a more frequent desire than in the normal condition to urinate. The stream is smaller than usual and presents a twisted, forked or divided appearance.

In the majority of cases there will be found a purulent secretion from the urethra, which may present a yellowish or transparent appearance. In some cases the first symptom the patient has of stricture is a complete retention of urine, the stricture having existed for some time, but after a debauch or over indulgence in eating and sudden exposure to cold, retention of urine develops.

There are marked chemic changes in the urine if the disease is of a chronic character and has not been treated or relieved. The urine becomes almost opaque, and gives a distinct ammoniacal odor and leaves a sediment of mucus and pus, which is of a tenacious character and adheres to the bottom and sides of the vessel. The urine becomes alkaline.

Hematuria is a rare symptom of stricture. In addition to the local symptoms of stricture there are some constitutional disturbances.

The patient presents an anemic appearance, suffers from dyspepsia and becomes irritable and complains of pains in the back and loins. Has chilly sensations, followed by perspiration.

PATHOLOGY OF STRICTURE.

The pathology of stricture of the urethra is that of a simple inflammation which may affect the epithelial and submucous basement membrane of the urethra, and at the same time the corpus spongiosum may be involved. Where the stricture is slight the urethra anterior to the constricted portion is normal; but in severe and chronic cases where the anterior portion of the urethra becomes affected it is contracted.

The urethra posterior to the stricture is almost always dilated, which dilatation is caused by the obstruction to micturition. There is a loss of elasticity in the urethra, and it becomes so enlarged as to easily admit the finger; pouches may form and appear as fluctuating tumors in the perineum.

The gleet discharge, as a rule, comes from behind the stricture where the mucous membrane is in a state of chronic inflammation. The walls of the urethra may become ulcerated with abscesses and fistulae. The walls of the bladder are hypertrophied, caused by interference with the flow of urine.

The ureters and kidneys are affected. The ureters become dilated; the pelvis and infundibula and calices of the kidneys are distended, while the medullary structure of the organ undergoes atrophy. Not infrequently the penis becomes hypertrophied, especially where the stricture is of long duration.

DIAGNOSIS.

The symptoms I have already mentioned might be considered sufficient to diagnose stricture, yet there are other diseases of the urinary organs that have symptoms so similar to those of stricture that they might be mistaken for it. Inflammation of the prostate gland of a subacute character, and neuralgia of the urethra and hyperesthesia may have all the symptoms that I have described as having occurred in stricture. The safest method of diagnosing stricture is to make a careful and thorough exploration of the urethra with instruments. The instruments necessary for a physical examination of the urethra and to determine the presence of a stricture are a complete set of sounds, solid and flexible bougies and catheters.

I know of no better instruments than the bulbous bougies for exploring the urethra for stricture.

Dick's elastic or gum bougie, and the oral tipped wire bougies of Otis are invaluable.

I prefer to use flexible bougies for exploring the urethra for a stricture. I find them easier to introduce, and they certainly cause less irritation and pain than metallic sounds. The chief kinds of non-metallic flexible instruments are English gum elastic catheters; the most common of solid instruments are the sounds or bougies and the ordinary catheter.

In order to ascertain whether a stricture exists, the number and character of the obstruction and what portion of the canal is affected, I would recommend the introduction of a No. 9 or 10 acorn or bulbous pointed bougie. I have observed that I can detect a slight stricture better on the withdrawal than on the introduction of the sound, since the abrupt shoulder of the bulb impinges more decidedly against it. A graduated bougie can be used in order to ascertain how far the stricture is from the external meatus.

Having found a stricture and its location by exploration, it is important to know its caliber. This can be judged of pretty accurately by the size of the stream; the caliber of the passage is a little less than the volume of the stream. The urethrometer is an instrument by which we can obtain an accurate measure of the urethra in its normal condition.

Dr. Otis contends that there is a relative proportion existing between the caliber of the urethra, and the size of the penis. For example, when the flaccid penis about three-fourths of an inch back of the corona glandis measures three inches in circumference, the size of the urethra is thirty millimeters in circumference or more.

THE TREATMENT OF STRICTURE OF THE URETHRA.

The treatment of organic stricture of the urethra varies according to the type we find in the canal. It is one of the most difficult problems in urinary surgery to make a fixed rule as to the selection of the best mode of treatment in the different types of stricture.

Dilatation is one of the safest and mildest modes of treatment of stricture for the urethra. It is a method more frequently used by surgeons than any other form of treatment, having been employed in the time of Galen and used extensively up to the present time. It can be accomplished slowly by the introduction of sounds and bougies.

This method of treatment may be continuous dilatation or interrupted. Before the introduction of bougies and sounds in the urethra they should be thoroughly sterilized by heat or carbolic acid or by friction with a clean towel. The instrument before introduction should be warmed to the temperature of the body, oiled with 1 to 40 carbolized oil. In order to obtain local anesthesia, hydrochlorate of cocain as suggested by Dr. Kohler can be used. Can inject about half a drachm of a 4 per cent. solution of cocain into the urethra. An ordinary hypodermic syringe may be used, at the end of which I attach Otis' cocain tube. Local anesthesia is produced within five minutes.

In several cases where I have used injection of cocain in the urethra for local anesthesia I have observed alarming symptoms of toxic effects, accompanied by delirium and tetanic fixation of the muscles of respiration.

Stimulants with hypodermatic injection of strych-

nia and chloral by enema give the best results in correction of this condition.

In the treatment of a simple case of stricture of the urethra by gradual dilatation, I prefer to use a flexible bougie as large as the stricture will comfortably admit; after it is passed I withdraw it at once, however, there is a great difference of opinion among surgeons as to whether the bougie should be withdrawn at once or allowed to remain in the urethra for ten minutes to half an hour.

The operation may be repeated on the third day, introducing the same sized bougie first, and the next size larger, and so on increasing the size until the stricture is dilated to the caliber corresponding with that of the external meatus. It is important to instruct the patient how to pass the instrument on himself, as the treatment should be continued for several years. Should pass the bougie at least once a week, increasing the interval to once a month.

When a stricture is located more than four inches from the meatus there is no treatment as safe and none that will give better results than gradual dilatation. A quicker method of dilatation than the one I have just described is known as "continuous dilatation." A catheter or one or more whalebone filiform bougies may be inserted in the urethra and retained not longer than forty-eight hours. Within twenty-four or forty-eight hours suppuration takes place; a purulent discharge comes from the constricted portion of the urethra, and the canal is rapidly enlarged.

Other instruments may be passed as in gradual dilatation until the normal diameter of the urethra is obtained.

Many reasons have been given as the *rationale* of dilatation, but the one now agreed upon by the majority of surgical authorities, is that, "so far as it effects any permanent good results it acts by promoting absorption."

Now the first or immediate improvement must clearly have been due to the mechanical action of the dilating body on the stricture.

According to the authority of Sir Henry Thompson most kinds of strictures contain two structural elements, physiologically considered, or one element in two different degrees of development—the one absorbable; the other non-absorbable. The former is supposed to be removable by the act of dilatation; the other not so, but only amenable to mechanical distension, the effects of which are temporary. The relative proportion, then, of these two elements determine the degree of success which dilatation is capable of accomplishing in the urethra.

The operation for the relief of stricture by internal urethrotomy is performed with an instrument known as the urethrotome.

The instruments in use are of many different kinds. The one most frequently used is that of Maisonneuve, which has been modified by different makers at the suggestion of different surgeons. His instrument consists simply "of a grooved staff, which need not exceed No. 7 French catheter scale, provided at its extremity with a screw point, to which is attached a filiform bougie. The blades intended to slide in the grooves and to divide the stricture, are triangular in shape, sharpened before and behind, but blunt at the apex, so that it may pass over the sound urethra without wounding it."

Civiale's urethrotome was a very popular instru-

ment, and is highly recommended by Sir Henry Thompson. At the end of the shaft of this instrument is a bulb, in which the blade is concealed equaling about No. 16 or 17 American scale. It cuts from behind forward. The instrument can not be introduced until the stricture is dilated sufficiently to admit No. 16, which is a great objection to the use of this urethrotome.

Prof. Otis has invented several dilating urethrotomes, known by instrument makers as Nos. 1, 2, 3 and 4. These instruments consist of a pair of steel shafts connected together by short pivotal bars, on the plan of an ordinary parallel ruler. They are separated by means of a screw at the handle, near which is a dial indicating the extent of their divergence. The upper bar of the instrument is traversed by a urethrotome, terminating in a thin, narrow spring blade, which when at the extremity of the groove in which it runs, is concealed in a slot.

The instrument and its contained urethrotome, having been passed down behind the site of the stricture, and dilated until the stricture is made tense, the handle of the urethrotome is withdrawn, causing the blade to rise from the depression in which it was concealed, and the stricture is divided upon its upper wall from behind forward.

This instrument is to be preferred in strictures of large caliber; it is easily introduced and has great strength. Other advantages it has, that it attacks a stretched instead of a flaccid stricture. The incisions are made at a pre-arranged place, extent and depth.

Prof. Otis reports 2,297 operations of dilating urethrotomy without a death or permanent disability of any sort. He contends that re-contraction of the stricture after the operation is rare.

There is but little risk of hemorrhage after the operation of internal urethrotomy; if hemorrhage should occur from the pendulous portion of the urethra, it may be stopped by placing the penis upon the belly, "laying a handful of cotton over the organ and strapping it down with a bandage carried around the pelvis."

The patient should remain in bed for several days and be kept perfectly quiet. Sounds and bougies should be introduced for some time after the operation of urethrotomy, until the urethra is dilated to its normal size.

The operation of urethrotomy is not always a success; a recurrence may follow, especially if the stricture has existed for a long time and is greatly indurated. If the stricture should recur after having performed internal urethrotomy I would advise gradual dilatation.

Strictures at and around the meatus are best operated upon by a blunt pointed tenotome which gives the surgeon greater accuracy in making his cut than by the old method of dividing the stricture by Civiale's concealed bistoury.

In a small percentage of strictures there will be found cases where on account of the tightness of the stricture it will be impossible to introduce the urethrotome until the stricture is dilated sufficiently to pass the instrument. In cases of this kind, dilatation can be done efficiently with Banks' dilating filiform bougies, known as immediate dilatation, or it can be accomplished by the method I have just described, continuous dilatation.

When dilatation has been sufficiently made, the urethrotome can be passed and the stricture cut.

Strictures located near the external meatus may be cut with but little risk and give the best results. Strictures within three inches of the external meatus re-contract so quickly and the surrounding tissues are so unyielding that the operation by the urethrotome is the best mode of treatment.

In some cases of stricture the constriction is so great that it is impossible to pass any instrument, and at the same time it may be complicated with infiltration or retention of urine or abscess. The operation of external perineal urethrotomy should be performed at once in order to save the life of the patient. The stricture at the time that the operation is decided upon may be found in one of three degrees of constriction:

1. The stricture may be opened sufficiently to introduce a grooved sound, which will act as a guide when the knife is passed through the perineum in its division of the obstruction. The operation thus performed is known as external perineal urethrotomy with a guide.

2. When it is impossible to pass the stricture through the normal canal, we may succeed by introducing a grooved staff which terminates with a button-like end until it reaches the obstruction, then perform the usual perineal incision and open the urethra about a quarter of an inch in front of the stricture. The anterior face of the stricture is shown and the proximal orifice is discovered through which a fine probe can be passed, and afterwards a grooved staff upon which a free division of the constricted tissue can be made. When the operation is complete pass a catheter, which is to be retained for three or four days. This method is known as "Wheelhouse's operation."

As a last resort and when unsuccessful by the above methods of treatment open the urethra behind the stricture, at the apex of the prostate gland, known as "Cook's operation."

Resection of the urethra as a radical measure in the relief of severe forms of deep urethral stricture due to injuries, has been done successfully during the past year, chiefly by French surgeons.

Guyon, of Paris, advocates partial resection of the perineal urethra in preference to total resection, especially where the cicatrices involve only the floor of the urethra. If complete resection of the urethra be performed the elasticity of the surrounding tissues produces greater retraction between the resected edges of the urethra than could otherwise take place. Slight resection, the after cicatricial contraction in connection with the floor of the urethra, the roof not being disturbed, tends to increase rather than to diminish the caliber of the urethra at that point. Albarran has operated five times by partial resection of the urethra. All of his operations were successful, and cured in from two to three weeks. He contends that it is more difficult to get union by first intention in a case of stricture due to gonorrhea than of traumatic origin, as when of gonorrheal origin there is always a chance of infection and subsequent suppuration.

Herteloupe, of Paris, reports eleven cases of successful resection of the urethra. He does not advocate this operation when the stricture is of gonorrheal origin.

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