for drainage it is then inspected. If the urine flows drop by drop the catheter is properly placed. Its end is attached to a tube leading over the side of the bed into an antiseptic solution.

Complications and Precautions.—Some patients cannot endure a retained catheter. It sets up continuous vesical spasm. The selection and proper introduction of a small smooth instrument will go far to overcome this in some cases, and, if necessary, the patient should be kept under the influence of morphin for twenty-four hours before the attempt is abandoned.

A purulent urethritis almost invariably results from the use of a retained catheter. It is due to the presence of the catheter, but in a sense is bacterial as well, since it is associated with and in part caused by a pullulation of the urethral bacteria. This urethritis usually produces few symptoms beyond a free discharge of pus from the meatus, and it subsides when the catheter is withdrawn; but if neglected it may lead to ulceration of the canal, and so increase the stricture. To minimize the urethritis a smooth clean instrument should be chosen and the anterior urethra irrigated by the Janet method before the introduction of the catheter, as well as every time it is changed.

Urinary fever and urethral chill may be unavoidable. But if the antiseptic precautions just laid down are observed, if the catheter is working properly, so that no fluid is allowed to accumulate in the bladder, and if urotropin is administered, the danger of septic complications is minimized. A single chill may be disregarded, but if, in spite of all precautions, the patient's condition gets worse instead of better, the catheter must be withdrawn.

Cystitis and stone may be avoided by cleanliness and frequent changing of the instrument.

CHAPTER XIII

STRICTURE OF THE URETHRA—PROGNOSIS AND TREATMENT

PROGNOSIS

Although the prognosis of stricture depends upon the treatment more than upon any other one thing, the progress of the disease varies according to the nature and location of the scar. Traumatic strictures often contract rapidly, in spite of all the surgeon's efforts. Gonorrheal strictures, on the other hand, contract far less energetically. Strictures of the perineal urethra are far more difficult to cure than strictures of the pendulous urethra. The latter contract slowly and are commonly curable; the former contract more rapidly and are, in the majority of cases, incurable—that is, they may be relieved by sounding or urethrotomy, but they usually relapse after a time. Finally, the more extensive a stricture the more irregular its surface, and the denser the cicatricial tissue composing it the more difficult will be its treatment and the more dubious its cure.

In the matter of life or death, however, the prognosis of stricture is far less gloomy. Stricture is not often fatal, except in neglected cases, such as are sometimes encountered in hospitals. Death occurs in various ways. Not to mention the rare cases of sudden death following the simple introduction of an instrument, and only alluding to rupture of the bladder and death following surgical operations for the relief of stricture, the causes of fatal termination in cases of stricture are three:

1. Extravasation of urine, which, if extensive, kills at once by shock, or, later, by exhaustion, suppuration, abscess, gangrene, or pyemia.

2. Chronic uremia, usually associated with septicemia, from the involvement of the kidneys in the inflammatory process. The patient may die from such a cause even after the stricture has been dilated, or, as is more commonly the case, the treatment itself, whether by sound or knife, may induce a reflex congestion of the diseased kidneys, which closes the scene.

3. Cachexia and exhaustion, attended by pain, loss of rest, and inability to eat, due to the torment of constant unrelieved desire to urinate, and the agony and labour of the act. No more pitiable sight can be imagined than that of a man with pericystitis, trying to pass water every five minutes through an old tight stricture. Standing up, with his body bent forward, his head leaning against the wall, or on his knees, and half doubled up, his hands clutching at anything within reach, he writhes and groans in agony, the sweat starting from his face, his whole body quivering and convulsed with pain. After a minute of this torture, he finds he has passed, perhaps, a teaspoonful of bloody, purulent, putrid urine, perhaps nothing at all, and he sinks exhausted upon his bed, only to renew the effort after five or ten minutes. No man can long endure torture of this sort. If the surgeon does not soon bring him relief, death will be more kind.

TREATMENT

The principle governing the treatment of stricture is simplicity itself. *Enlarge the urethra by dilatation, aided, if necessary, by cutting. Then maintain its calibre by dilatation.* Or perhaps the negative view is more forcible. *Never cut if you can dilate; and recognise that the patient is not cured unless he stays cured.* Cutting is at best a substitute for dilatation, while divulsion and electricity are no substitutes.

Prophylaxis

Since most strictures are caused by gonorrhea, and the occurrence of gonorrheal stricture is favoured by the intensity and the duration of the inflammation, every effort made to control this inflammation is so much towards the prevention of a possible stricture. Yet this is but an indirect prophylaxis, since it is impossible to prophesy which case of gonorrhea will culminate in stricture and which will not. But when the disease becomes chronic *in the anterior urethra*, although there be no stricture present the inflammation is encouraged by and is in turn encouraging a periurethral sclerosis, which may soon develop from this chrysalid state into a veritable stricture. Therefore, the systematic treatment of chronic anterior urethritis is the surest preventive of stricture.

For traumatic stricture the proper prophylaxis is immediate perineal section at the time of injury (p. 38).

Curative Treatment

The Action of Sounds.—Since the sound is the instrument best adapted to the cure of stricture, and since, unfortunately, it is easier

to use a sound wrongly than rightly, a few words on the use and effects of sounds are required.

The surgeon attacking a stricture of the urethra may fairly analyze the therapeutic problem thus: "Here is a scar with a congested surface; shall I cut or shall I massage it?" If he cuts through it the symptoms are relieved, the obstruction is apparently removed, but the scar is still there. In fact, there is rather more scar than ever, and if the former scar contracted and gave trouble, so much the more will this one. To prevent this he will keep the lips of the wound separated by sounds, so that it may heal with so broad an insertion band that the contraction will be of no moment. Such a course may well succeed in the pendulous urethra; but, if the stricture is in the perineal urethra and of such density as to give the shadow of an excuse for cutting, it will certainly relapse after the operation unless subjected to systematic massage by sounds. The knife only relieves the congestion plus a temporary relief of the contraction, while the sound actually causes the resorption of the scar tissue. The effect is quite comparable to the reabsorbing effect of massage applied to the outside of the body. The exact nature of the process is not known, but the practical conclusion of universal experience is that *the maximum of effect is produced by the minimum of effort*, or, as Guyon puts it, "the effect is due, not to the pressure of the sound, but to its mere contact."

It is a matter of every-day experience that the brutal passage of a sound, bruising and tearing the congested urethra, is followed by a sharp inflammatory reaction, which probably increases rather than diminishes the scar tissue. Such treatment is inexcusable. The stricture is already congested, the mucous membrane already inflamed. What more futile procedure than to add irritation to irritation! Such is not the object of the sound. On the contrary, the sound, if a metal one, should slip in as nearly as possible by its own weight; slowly indeed, but surely. Such a maneuvre has the treble effect of lessening congestion at the point of contact, straightening out irregularities in the canal, and stimulating the deeper tissues to a favourable reaction, which will result in softening the cicatrix. But to do this the sound must press without bruising. If a given sound will not pass, try a smaller one. The effect is readily judged. If a sound is properly introduced, it may usually be followed by sounds of the next larger sizes with less pain than the first. Larger sounds may be introduced at each sitting; the rapid amelioration of the symptoms shows that the congestion is relieved, the obstruction is disappearing, and the canal is resuming its normal condition. Yet, however gently a sound is introduced, it will be followed within

forty-eight hours by a congestive reaction of more or less intensity. Hence, in treating stricture by dilatation it is bad surgery to introduce instruments—unless filiforms—before the lapse of seventy-two hours, and even longer intervals will often produce better results.

Lastly, and above all, gently, *gently*, GENTLY!

The Treatment of the Various Kinds of Stricture

The treatment of stricture at the meatus and of spasmodic stricture has been dealt with. The treatments of fistula, extravasation, etc., and of the remoter complications are considered under their respective titles. Apart from these, the treatment of stricture may be considered under the following captions:

1. Stricture of large calibre.
2. Stricture of small calibre.
3. Stricture admitting only a filiform.
4. Stricture complicated by retention.
5. Impassable stricture.
6. Traumatic and resilient stricture.
7. Inodular or indurated stricture.
8. Stricture complicated by prostatitis. (Irritable stricture.)

1. Treatment of Uncomplicated Stricture of Large Calibre.—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 gonorrhea, with, possibly, some frequency in urination. These cases are of daily occurrence and often pass unrecognised, the gleet being treated, the stricture overlooked. Too much stress cannot be laid upon the importance of exploring the urethra with the bulbous bougie in such cases. One, two, or more strictures are found, the smallest, which is probably the deepest, allowing passage, perhaps, to a No. 15 bulb.

Treatment here is most simple. After the diagnosis has been made, no further instrumentation is advisable (if the patient can spare the time) until the effect of exploration has been observed. The chances of urethral chill after first examinations must be remembered. The patient's general condition and habits must be studied, and his urine tested for acidity or possible kidney disease. He must be instructed in urethral hygiene, the nature of his malady must be explained, and, to forestall future disappointment, he should be informed at the outset that, after his symptoms have been removed by treatment, the permanence of his cure, *if his stricture is in the deep urethra*, may depend upon his use of an instrument upon himself at proper intervals, in order to prevent recontraction.

Being instructed not to mind the smarting at his next urination,

and given such alkali, balsam, or injection as the condition of the urine and amount of discharge seem to call for, the patient is dismissed to return in two days for treatment. I have recently adopted urotropin as a preventive of urinary chill from sounding, as well as in the other operations of the urinary tract. One gramme (15 grains) a day may be administered, either alone or in combination, beginning two or three days before the urethral exploration or operation. It has proved most efficacious.

Sounds.—The treatment best adapted to the majority of these cases is dilatation with a conical double taper steel sound. One of these instruments properly warmed and sterilized is introduced in the manner already detailed. Its size should correspond to that of the blunt sound that has passed the stricture, and the utmost delicacy, care, and gentleness should be used in its introduction. The wedge and lever should not be forgotten, nor should we abuse power because we possess it. To overcome resistance, patience is better than force. As soon as the instrument has entered the bladder it should be gently withdrawn at once. Nothing is gained by leaving it even for a moment. During withdrawal the stricture is usually felt to grasp the sound. After one sound has been withdrawn, a second and even a third may be introduced, if considered safe. No rule, nothing short of personal experience, can indicate how far the dilatation may be pushed at one sitting. The tendency is always to hurry and to use force, a course detrimental to rapid progress. It may be stated as a rule, subject to judicious exception, that *if a conical steel instrument of any size larger than No. 15, when held in proper position, will not enter a stricture by its own weight after a little delay, it should not be used.* Every urethra, however, has its own temper; some are aroused by the slightest disturbance, while others bear considerable violence without protest. A surgeon should acquaint himself by gradual experiment with the temper of a given urethra before he takes liberties with it.

The mischief to be feared from the employment of large sounds with force, besides false passages which are not likely to be produced by large instruments, is threefold:

1. Epididymitis, a common result of violence to the urethra, and a complication which suspends treatment and confines the patient to bed for several days, or, it may be, weeks.
2. Inflammation in the stricture, which aggravates its condition and defeats the end of the treatment.
3. Chill and urethral fever.

In rare instances epididymitis may come on in spite of care. This complication must be properly attended to, and all treatment

of the urethra suspended until the pain in the testicle has subsided and the swelling of the epididymis has assumed an indolent character. It is not necessary to wait for the latter to disappear entirely, and, if extra care be employed in resuming the use of instruments, there is little danger of provoking relapse. While using instruments in the urethra, especially at the beginning of a course of dilatation, the patient may be advised to wear a suspensory bandage.

If the stricture is really uncomplicated—i. e., if there is no cystitis or prostatitis—it cannot be irritated except by overtreatment. The management of a stricture complicated by these inflammations deserves special mention (see below).

The third danger, the chill and fever, is very unusual after manipulation of the pendulous urethra—witness the impunity with which many young surgeons cut far and wide through that part of the long-suffering canal—and increases as we approach the bulbo-membranous junction. Some persons have a predisposition in this regard, and the presence of some catarrh of the prostate is almost essential as a predisposing cause of any real septic chill. Yet in no given case can the prognosis be definite, and the only safety lies in hedging the operation about with all possible precautions. The rule which I have found most efficacious is—

Urotropin before,
Gentleness during,
Nitrate of silver after.

The nitrate is best applied by instillation in the strength of 1:1,000 (p. 134). While not essential, it is safe to *end every séance with this instillation.*

At each subsequent visit of the patient, the surgeon commences with a sound from one to two sizes smaller than the last instrument introduced at the previous visit, and carries the dilatation as far as possible without the employment of force—this till the full size is reached.

The most important feature in the treatment of stricture by dilatation is a proper regulation of the intervals to be allowed between the visits. The intervals usually recommended are too short. Occasionally we see patients who attempt to treat themselves, introducing a bougie into the urethra daily, or twice daily, perhaps at every act of urination, aggravating every symptom, worrying the urethra and bladder into a state of inflammation, and wondering why the stricture does not get well. Some surgeons, unfortunately, are guilty of the same error. We can only repeat that *it is bad surgery, in treating stricture by dilatation, to reintroduce instruments—unless filiform—before the lapse of at least seventy-two hours, and even longer intervals will often produce better results.*

As to the degree of dilatation which is to be aimed at, every urethra has its own gauge in the size of its meatus—provided that meatus be not congenitally small, nor contracted by disease. If there is any cicatricial tissue in the circle of the meatus, or if a probe can make out any pouching below the lower commissure (Fig. 35), the meatus is too small.

The normal meatus, however, is the smallest part of the healthy canal, and the object in view is to bring all available pressure to bear upon a morbid narrowing of some other portion of the tube. To do this the meatus must be lightly put upon the stretch. When this is done, the feeling is one of discomfort, which subsides after the instrument has been in place for a moment. If the meatus is overstretched, a distinctly marked, narrow white line will be seen encircling the instrument upon the lips of the urethral orifice, indicating that the latter have been deprived of blood by pressure. The use of double taper sounds makes this stretching transitory, and therefore much more bearable.

In the majority of cases this physiological gauge—the normal meatus—is absolutely satisfactory. A stricture once dilated to this size—which will vary from 27 to 32 French—will stand the test of a cure—that is, the inflammation about it (not necessarily the prostatitis) will rapidly disappear, and the stricture will not recontract during the lengthened intervals of sounding that constitute the after-treatment. But occasionally the meatus is too small a gauge. The outer fibres of the scar lie so deep and are so elastic that they are unaffected by the pressure and tend to recontract as soon as the lengthened intervals of sounding permit them to do so. Such strictures must be cut or stretched until a point is reached where they do not recontract. To do this the integrity of the meatus must often be sacrificed.

Otis's Theory.—Such was the basis of Dr. Otis's famous theory. Meeting many strictures incurable by the half-hearted methods of dilatation then in vogue, and finding that a generous incision cured stricture of the anterior urethra, he evolved the theory that the urethra is an evenly calibrated tube whose size bears a direct relation to that of the flaccid penis. This ratio he fixed at 10 mm. of urethral circumference to every inch of penile circumference. Thus, a 3-inch penis should take a 30 French; a 3½-inch penis a 34 French. The objection to Dr. Otis's theory is that it is incorrect. The urethra is no more an evenly calibrated tube than the ureter, the esophagus, or the bowel. Its size no more varies with that of the

penis than does the size of the esophagus with that of the neck. The objection to Dr. Otis's practice is that it involves an unnecessary and harmful amount of cutting, since, as a rule, the patient can get well without it, and the operation leaves the canal defective in expulsive power. The last drops of urine dribble away drop by drop, to the great inconvenience of the patient. Moreover, though this wide cutting cures strictures of the pendulous urethra, it does not cure deep strictures. The latter get well sometimes under all varieties of treatment—in most instances they require the occasional use of sounds for an indefinite period.

Yet Dr. Otis's work deserves the highest praise, in that he has shown us what great sizes may be attained with safety. And although he has not proved that his treatment is always essential, he has proved it most desirable in strictures of the anterior urethra incurable by a moderate course of sounds. Only recently Albarran and Guiard in France have insisted that some strictures must be dilated above 23 French!

Urethrotomy.—If at any stage of dilatation the stricture rebels and will not be dilated any further, the urethrotome must be resorted to.

Choice of Urethrotomy.—As was mentioned in describing the operations, external section is best suited to deep strictures, internal section to strictures of the pendulous urethra. There still remains a choice of instruments for internal urethrotomy, which choice is simply a matter of taste. For my part, I like Civiale's urethrotome for strictures near the meatus, Otis's dilating urethrotome for any other stricture large enough to admit the instrument, and Maisonneuve's urethrotome only for those strictures through which an Otis instrument will not pass.

After-treatment.—The after-treatment depends upon the location of the stricture.

If the stricture is in the pendulous urethra, the surgeon may feel confident that a cure persisting three months will prove permanent. When the stricture has been dilated fully, so that there are no longer any large shreds in the urine (unless from the posterior urethra), the patient may be dismissed to report in two weeks. If at that time there is no recontraction, he may be dismissed for a month, and again for two months, when his cure may be pronounced permanent. If, however, there is a relapse on any of these occasions, biweekly visits must be renewed, and the patient's cure insured by higher dilatation or a further cutting.

If the stricture is in the bulb the matter is different. In all such strictures, except those soft bands that yield to one or two passages

of a sound, recontraction will almost inevitably take place, unless the cure be maintained by the patient. This is easily done, and no intelligent patient objects to it. In a few lessons he acquires the art of gently passing a sound upon himself, and he should be seriously cautioned to perform this trifling but important operation at first weekly, then fortnightly, then monthly, studying his own case to determine how long an interval he may allow without sensible recontraction of his stricture. In this way, in some cases, the use of instruments may be gradually abandoned; in the majority, it will have to be continued indefinitely, at intervals varying from a week to a year. Thus the cure becomes radical. The surgeon is responsible for the cure only on condition that the patient carries out this plan; or, rather, the patient is responsible for the permanence of his own cure, and this he must be made distinctly to understand.

2. **Stricture of Small Calibre.**—To this class belong strictures admitting any instrument less than No. 15 French. They are considered separately, not because they require different treatment, but in order to emphasize the fact that they are better treated with soft than with steel instruments. The danger of making a false passage in an obstructed urethra with a small metallic instrument cannot be overrated. No one can appreciate the ease with which a false passage is made until he has himself made one. Indeed, it is not very uncommon for a patient or a surgeon, not well acquainted with the urethra, to make a false passage, and to go on dilating it instead of the stricture, wondering meantime that the size of the stream is not increased nor the symptoms alleviated. A surgeon who knows every line of the urethra may occasionally assume the risk of using a small metallic instrument in the canal without a guide, but only in exceptional cases. Below No. 15, soft instruments only should be employed, unless there be a guide through the stricture.

Dilatation is carried on as already directed, steel instruments being used as soon as the stricture will admit No. 15. Progress is slower with soft than with steel instruments.

Cutting (internal or external urethrotomy) operations are daily growing in favour in the treatment of strictures of small calibre; yet, in a case of uncomplicated stricture in the deep urethra, no matter how tight, if not resilient, and not of traumatic origin, if any instrument at all can be passed, dilatation is still the best method of treatment. Scarification and divulsion are mentioned only to be condemned. If you cannot dilate, cut; never divulse. Cutting may be resorted to:

a. If the stricture will not dilate.