since oil or vaseline would coat the mucous membrane and interfere with the action of the solution.

Finger has devised an ingenious apparatus by means of which he varies the pressure of the liquid in the urethra without varying the elevation of the reservoir. The apparatus is practically a very large barrel-syringe fastened vertically against the wall. The lower end is provided with a rubber tube, a yard or more in length, terminating in a short pear-shaped nozzle fitted with a stopcock. The upper end of the barrel is simply a loose-fitting cover perforated by the piston-rod. To obtain a minimum pressure both cover and piston may readily be removed; to obtain greater pressure the piston is allowed to rest on the surface of the liquid in the barrel, and weights are placed on a disk fastened for this purpose to the upper end of the piston-rod. Ultzmann's instrument is an excellent one, but with the metal catheter which he employs there is greater danger of damaging the inflamed mucous membrane than with the soft catheter.

Of the many solutions used for irrigation of the deep urethra, the following are among the best: Nitrate of silver (1 : 20,000 to 1 : 500 of distilled water), bichloride of mercury (1 : 80,000 to 1 : 10,000), sulphate or acetate of zinc (1 : 1000 to 1 : 100), and permanganate of potash (1 : 20,000 to 1 : 1000). Ultzmann's method was as follows: There was prepared a solution containing 1 part each of crude alum, zinc sulphate, and carbolic acid in 500 parts of water. For the first irrigation this solution was diluted with three times its bulk of warm water. If well borne, the strength was gradually increased until at the end of three or four days or a week the solution was used in full strength.



This preparation was then changed for a solution of permanganate of potash, 1 : 20,000, gradually increased in strength up to 1 : 1000. Lastly, a solution of nitrate of silver, 1 : 2000, was substituted, and was gradually increased in strength to 1 : 1000. Irrigations were given daily.

As with injections, weaker solutions should be tried first, and the strength gradually be increased when necessary and when the resulting irritation of the urethra is slight. They may be used at first about once in three days, but when the urethra becomes accustomed to the process and shows a milder reaction after it, they may be given every other day or even daily. At each irrigation about 4 ounces of the warmed solution should be used in the posterior urethra, after the anterior urethra has been cleansed thoroughly. The bladder should be about half full, that the urine may dilute the solution sufficiently to prevent injury to the bladder-walls. It is desirable to have the patient retain his urine for some time after the irrigation, that the medicament may be left as long as possible in contact with the mucous membrane of the urethra.

In case both anterior and posterior urethritis are present, and irrigation is practised every second or third day, the patient may use an injection once or twice a day. If after two or three weeks of such treatment the subjective symptoms disappear, the discharge is reduced to a drop or two of mucus, and the urine is clear but for a few shreds, the irrigations and injections should be given at gradually increasing intervals for a week or more, and then be stopped entirely. A week or two of rest from local treatment may remove these last traces of the disorder; if, however,

they persist, the case may be considered one of the second class, and treatment with instruments is then proper.

*Treatment of Cases of the Second Class.*—In these cases the subjective symptoms, the discharge from the meatus, and the cloudiness of the urine are slight but persistent, and are usually due to local lesions. In a large proportion of cases stricture in some form or degree will be found, and is the most important and first lesion to be treated. In the absence of stricture there may be congested or infiltrated and thickened patches of mucous membrane or of submucous tissue. There may be inflamed follicles and lacunæ, or small areas of granulations, or superficial losses of tissue. When these conditions exist, they should be sought for and located by means of the steel sound, the bulbous bougie, or the urethrometer. In some cases of the torpid and persistent type no local lesions can be found, but there may be, instead, an atonic and mild catarrhal condition of a considerable portion of the membrane.

In almost all cases of chronic urethritis of the second class the most effective local treatment is found in the proper use of the steel sound. The dilation of the urethra by the full-sized steel sound opens and smooths out the folds and lacunæ of the mucous membrane, thus freeing them of retained secretions which the stream of urine does not reach. The pressure exerted by the sound empties inflamed follicles of their contents and stimulates the process of absorption in the areas of congestion and thickening, while the effect of the cold steel upon granulating patches and upon an atonic, catarrhal condition of the mucous membrane is stimulating and often beneficial. The best instrument to use is a



smooth, blunt steel sound of the largest size that will pass the meatus without stretching it. It is not necessary, as a rule, to cut the meatus unless the latter be abnormally small. If this be the case, the narrowing is usually due to a thin band of tissue at the lower end of the aperture; behind the band is a small pouch that can be detected by the point of a probe introduced into the urethra for half an inch and drawn forward along the floor. This condition may be the sole cause of the persistence of a discharge, since it interferes with the free drainage of the urethra. In this case all that is necessary is simple incision of the thin band of tissue, followed by the use of sounds for a few days to keep the cut edges from reuniting.

Any incision of the meatus should be made downward in the median line, and not upward, and should be done slowly and with great care, not with a single stroke. Since the meatus is often normally the narrowest point of the urethra, it is sometimes necessary to enlarge it in order to introduce larger instruments for the treatment of the deeper parts. But this little operation, simple as it is, leaves the meatus in a condition not natural to it, and therefore cannot be entirely harmless. The physician who treats many obstinate cases of chronic urethritis will see a proportion of them in which the lips of a freely cut meatus gape widely and expose a considerable portion of urethral membrane which under normal conditions would be covered and protected. In this condition may be found the cause of not a few persistent urethral discharges. The surgeon who recognizes these facts will not look upon the mutilation of the meatus as a simple and harmless procedure, to be adopted as a matter of con-

venience, but will reserve the operation for those cases in which the meatus is abnormally small, or in which the condition of deeper portions of the urethra necessitates the use of instruments too large to pass the normal meatus.

Before introducing the sound it should be oiled, but not warmed. It should be introduced with great gentleness, allowed to remain from a few seconds to fifteen minutes, and as gently withdrawn. If the lesions to be treated are in the posterior urethra, the tip of the sound will be carried on into the bladder. It is rarely necessary to use a sound in this region more frequently than once in three days. If the lesions are limited to the pars anterior, the sound should not be passed further than necessary to affect the lesions, and a short, blunt sound is often more convenient than a curved one. Usually there is little gained in passing sounds oftener than once in three days, though they may be used more frequently in the pars anterior.

The use of the cold sound is especially valuable in disease of the pars posterior complicated by chronic prostatitis, prostatorrhœa, or sexual neurasthenia. In these cases the sound may be introduced as often as every second day, providing the irritation or reaction resulting from its passage subsides within a few hours; and when the urethra tolerates well the presence of the sound, it may be held in position from a few seconds to fifteen minutes before withdrawing. In place of the ordinary sound the cold sound of Winternitz (Fig. 23) may be used. This instrument is a metal catheter closed at its vesical end and divided into two channels by a longitudinal septum. Just within the tip the two channels communicate, while



externally they connect in a fork-shaped end with two rubber tubes. Water injected into one tube flows out of the other after passing through the entire length of

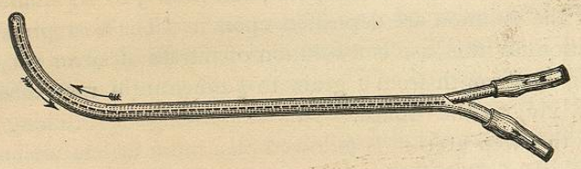

FIG. 23.—Winternitz's psychrophor (cooling sound).

the catheter twice. If the end of one tube be immersed in water and suction be made upon the other end, the water will flow through the catheter as in a siphon. It is well to begin with water at the temperature of the room, and to cool it gradually until eventually ice-water may be used. The application should last from five to fifteen minutes, and may be given about every second day.

Another method of treating disease of the pars posterior, highly recommended by Keyes and others, lies

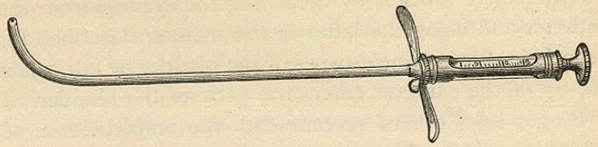

FIG. 24.—Keyes-Ultzmann syringe (Tiemann).

in the use of deep injections. The best instrument for the purpose is Keyes' modification of Ultzmann's deep urethral injector (Fig. 24). The tube of the catheter is capillary in size and open at the end. Before introducing the instrument the catheter is completely filled with

the liquid, so that for every drop forced out of the barrel of the syringe an equal drop escapes from the tip. The lesion to be treated having been located, the tip of the syringe is carried to this point, and from 3 to 10 minims of the solution are deposited upon it. The best preparation for this use is a solution of nitrate of silver varying in strength from 1 grain to ½ drachm (in rare cases gr. xlv) to the ounce. This cauterizing or "etching" of the deep urethra is followed by a more or less violent reaction. The desire to urinate is felt almost immediately, and for a few hours tenesmus and other painful symptoms may be present. The application should not be repeated oftener than two or three times a week, and never before the irritating effects of the previous application have entirely disappeared. Solutions of this strength should not be injected into any portion of the anterior urethra, hence the operator must know that the tip of the catheter has at least entered the membranous portion. With the finger in the rectum, exact location of the tip should not be difficult to one familiar with the use of sounds. If in any case the operator is in doubt, he can satisfy himself by detaching the syringe from the catheter and using the latter in the manner described for deep irrigation: urine escapes, if the bladder be full, when the tip of the catheter enters the neck of the bladder.

Finger and others recommend the introduction of lanolin instead of watery solutions, and Tommasoli devised a syringe for the purpose. The piston within the catheter is on a flexible rod marked in decigrams, so that the amount of the application can be regulated with accuracy. One decigram of the following solution may be placed in the deep urethra at each treatment:



| | | |
|---|---|---|
| ℞. | Argent. nitrat., | gr. xv–ʒj; |
| | Lanolini, | ʒiij; |
| | Ol. olivar., | ʒiss.—M. |

Sulphate of copper or creolin may be substituted for the nitrate of silver in this ointment. Regarding this form of medication Finger says: "The lanolin ointments possess the advantage of adhering intimately to the mucous membrane. If fluids, gelatin, or cacao-butter bougies are introduced, they are washed out of the urethra by the first micturition. On the contrary, the contracting urethral walls compress the lanolin ointment after the injection and press it into the mucous membrane. Micturition evacuates only small particles of the ointment; these particles are found in the urine even thirty-six hours after injection. Even pollutions do not remove all the ointment from the urethra. It therefore forms a real urethral bandage, and its protracted action and gradual absorption have a more favorable effect than the ephemerally acting solutions. In addition, as Professor Liebreich kindly informs me, lanolin is an aseptic substance."

The deep injection of an aqueous solution or a lanolin ointment immediately after using the cold sound is sometimes followed by excellent results. Finger recommends this combined treatment in old foci of infiltration in the pars posterior and in the bulb. For this purpose he uses the following ointment:

| | | |
|---|---|---|
| ℞. | Potass. iodid., | ʒiss; |
| | Iodin. puri, | gr. xv; |
| | Lanolini, | ʒiij; |
| | Ol. olivar., | ʒiss.—M. |

Other methods of medicating the deep urethra have been tried. Among those still in use are soluble bougies, ointments introduced on grooved sounds, and the injection of finely divided solids suspended in a sticky fluid. These methods are not so serviceable as those already given, and are rapidly falling into disfavor.

Finally, by means of the endoscope granulating patches, superficial ulcers, areas of congestion, inflamed follicles, and foreign growths in the urethra may be brought into view, and applications may be made directly to them. The most useful preparation is nitrate of silver in solution varying from 1 to 20 per cent., though it may occasionally be used much stronger. Sulphate of copper may be used in the same manner. Lugol's solution and other preparations of iodine, as well as carbolic acid in varying strengths, alone or combined with iodine and glycerin, are serviceable at times. Any of the above drugs may be applied in the form of lanolin ointment, and iodoform, iodol, aristol, or other powders may be used. For the application of solutions or ointments nothing is better than bits of cotton twisted on the ends of wires or on thin strips of wood such as may be obtained from match-factories. Ultzmann invented a brush apparatus for the purpose. The handle of the brush can readily be adjusted so that the brush will reach only that portion of membrane that projects beyond the rim of the endoscopic tube. After the use of strong solutions the surface should be dried of any surplus, to prevent its reaching other portions of the membrane; to lessen pain, iodoform in powder or in ointment may be applied. Applications may be made from once in three or four days to once in a week or two, depending on the



strength of the solutions used, the sensitiveness of the patient, and the amount of irritation that follows. When the condition begins to improve, the intervals between treatments should gradually be lengthened.

In general, with reference to local treatment of urethritis, it should be remembered that the use of an injection or an instrument in the urethra is followed by more or less reaction and irritation. The reaction may appear in the form of an increased discharge from the meatus, in case the pars anterior is alone affected, or in frequency of micturition and tenesmus when the pars posterior also has been treated. The symptoms usually appear at once, increase for a few hours, and then rapidly subside. Irrigation, deep injection, or instrumentation of the urethra should not be repeated until all evidences of a reaction from the previous treatment have been absent for twenty-four hours. Rough treatment of the urethra is never permissible. All instruments should be used with great care and gentleness. Mild methods and preparations should always be used in beginning the management of any case. If these methods prove insufficient, more energetic measures may gradually be adopted. During local treatment the sensitiveness of the urethra becomes dulled, and good results follow the employment of remedies which, if used at first, would produce violent inflammation.

As a rule, the first micturition which follows a local treatment of the urethra is attended by more or less smarting and burning, and, when possible, should be delayed for a number of hours, for when urination follows too closely the use of instruments, the much-to-be-desired rest of the recently treated parts is prevented, and often the amount of irritation and reaction is increased; after local applications the immediate passage of urine removes

some of the remedy and interferes with its action. In consequence, local treatment of the urethra should usually be preceded by evacuation of the bladder. The exceptions to this rule are found in irrigation of the deep urethra, for which the bladder should contain half a pint or more of urine, and occasionally in beginning the use of deep injections, when the immediate passage of urine may be desired to lessen the action of a remedy whose effect threatens to be too severe.

If improvement follows a certain treatment, it should be given with gradually diminishing frequency, and should finally be suspended. Its best effects will not be apparent until after the urethra has rested for a couple of weeks or more. If a given treatment fails to do good, it is usually best to follow it with a period of rest before trying anything else.

Finally, while studying and making intelligent application of local measures the successful physician will not fail to keep a constant watch over his patient's general health, habits, and surroundings.

**Prognosis.**—It is evident that in chronic urethritis a guarded prognosis is necessary, and many factors must be considered.

In the tubercular, cachectic, or anæmic, the future of the urethritis depends largely on the future health of the individual.

In a man who is violating the laws of sexual and general hygiene the future course of urethritis will depend chiefly upon the promptness and completeness with which he changes his mode of living to conform to these laws.

Recent cases that have received little treatment recover more promptly and certainly than do older cases. Old



cases that have been subjected to more or less constant and severe forms of treatment are among the most intractable. Such urethras can never return fully to their virgin condition, and such portions as have been destroyed by cutting or cauterizing can never be replaced by normal tissue. It may therefore be impossible to remove entirely the few shreds in the urine, the drop of mucus at the meatus, or the sensitiveness of the prostatic urethra that necessitates slight increase over the normal in the frequency of urination, though in all other respects recovery may be complete.

Disease of the pars anterior can usually be cured, while lesions that persist cause no serious symptoms, if exception be made of the extensive and deforming cicatrices which sometimes follow ill-advised operations.

Disease of the pars posterior is less accessible to treatment, and if complicated by prostatitis and neurasthenic symptoms the prognosis is less favorable. Some patients for weeks or months—even for years—after all evidences of organic lesions have disappeared will complain of vague, ill-defined, or even neuralgic pains and other uncomfortable sensations in the perineum, in the testicles, or in the end of the penis, together with a frequent desire to urinate, hyperæsthesia of the urethra, and irritability of the sexual organs. These symptoms usually vary with the general nervous condition of the patient, and with time, patience, and proper management (chiefly hygienic) most of the cases recover.

If stricture be the cause of a urethritis, the prognosis of the latter will depend on the nature and location of the former.

The contagious element in most, if not in all, cases of chronic urethritis may be removed.