AN ASEPTIC CATHETER FOR WASHING OUT THE BLADDER.

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A CATHETER is not clean or aseptic so long as air occupies the tube of the instrument. The surgeon cleans the outside of his catheter with the greatest care; the instrument is beautifully polished; and, before it is passed into the bladder, it is dipped into carbolic oil, or some other antiseptic unguent. Yet, in spite of all these precautions, it too often happens that the patient, a few hours after this trivial operation, has a severe rigor, followed by high fever and profuse perspiration; then comes on an attack of inflammation of the bladder, with putridity of the urine. Some have sought to explain these phenomena by supposing that the catheter, during its passage, has torn or injured some of the delicate nerves which are found just within the orifice of the bladder; and that all the unpleasant after-consequences are neurotic in origin, and not septic. If this be true, how is it that a man may have an acute-angled oxalate of lime calculus, rattling about in his bladder for years, and yet not suffer from any such severe symptoms as above mentioned; while, if a dirty sound or catheter be passed into his bladder, to test for the presence of a stone, such symptoms may come on at once?

I am with those who believe that the rigor, fever, and profuse perspiration, followed by inflammation of the bladder and putridity of the urine, are certain signs that septic matter has been introduced into the bladder by the catheter.

There is no better "cultivating medium" than urine in the warm bladder. The mere point of a needle, with septic matter on it, is sufficient to impart to it sepsis. Any one who has seen a beam of light pouring into a dark room, will allow that the air in the tube of the catheter is full of so-called "motés." When a catheter is passed into a warm bladder, the air within the tube begins to expand, because the instrument is warmed by the warm urethra. The cold air of the outside surrounding atmosphere acts as a buffer at the open end of the catheter; and as soon as the catheter comes into contact with the warm urine, a bubble of air escapes through the urine before the fluid itself rushes into the catheter. The bladder can never be perfectly emptied of its fluid contents, and, in the course of a few hours, the seeds of sepsis which have been left behind multiply a million-fold.

It is seldom that a metallic catheter is passed into the bladder without some injury being done to the delicate protecting epithelium of the mucous membrane. How often do we see blood withdrawn with the catheter after the bladder is emptied! Does not this show that in some places the mucous membrane has been torn or scraped, and the delicate blood-vessels exposed? It is in these situations that the absorption of septic fluid takes place. A mere speck of vaccine lymph, placed in the furrow of a scratch on the arm, is sufficient to affect the

whole organism. The rigor, fever, and profuse perspiration, following some hours after the passage of an aseptic catheter into the bladder, undoubtedly point to the absorption of some of the septic urine.

Some urines are better "cultivating media" than others, but urine which contains pus is peculiarly apt to putrefy after a dirty catheter has come into contact with it. It is in these cases that the surgeon ought to be more than careful when using his catheter. A septic catheter should never be passed into a bladder when the urine contains pus, especially if the surgeon be not sure whether the pus comes from the bladder or from the kidney. A patient, lately under my care, passed at least two ounces of pus in his urine daily. This

affection was first noticed in early childhood; it never ceased. It was not possible to form an exact diagnosis as to the source of the pus. This daily discharge of pus went on for more than thirty years. During the last two years he was under my observation, I examined his urine very frequently and carefully, under the microscope, using a 1/10 immersion-lens. I did not find, at any time, organisms in the pus, and when the urine was just passed it had no bad odour. There were never any symptoms of inflammation of the bladder. After his marriage, this gentleman was most anxious to be cured of his trouble, and went to London to consult a leading surgeon. A catheter was passed, and at least two ounces of pus were withdrawn from the bladder. Blood came away with the catheter as the instrument was withdrawn. That night my patient had a very severe rigor, great fever, and profuse perspiration. When he returned to Edinburgh, I again examined his urine under the microscope. It was now offensive in odour, and was loaded with organisms. Health now began to fail, and, from the symptoms which gradually came on, an exact diagnosis of the case was made. He was found to be suffering from a large cystic scrofulous kidney on the left side. It was now quite clear that the putridity of the pus in his urine had extended upwards to the pus escaping from his scrofulous kidney. After many months of suffering, an attempt was made to remove the diseased kidney, but the patient did not recover from the operation.

This was a very striking case, and made a great impression on me. Although this gentleman passed pus in his urine for more than thirty years, at no time during that long period was

there any septic condition of the urine. His health was generally fairly good. He was anæmic at times, but a course of iron kept him in good condition; and his muscular system was excellent. From the time a catheter was passed, all this was changed. His health began at once to fail. Sepsis of his urine was established, the scrofulous kidney was quickly affected, and general blood-poisoning followed. Naturally, one asks, could that sepsis, which led to this gentleman's death, have been prevented by the use of a perfectly aseptic catheter, when the bladder was first examined?

Another gentleman, under my care at present, had a catheter passed into his bladder when he was suffering from a gonorrhœal discharge.

It is now two years since that small operation was performed, and since then his bladder has been in a state of chronic inflammation, and his urine, as it passes from the bladder, is found, under the microscope, to be loaded with organisms, and these can be seen in the pus and epithelial scales which come from the bladder. He has suffered frequently from swollen testicles, without fresh gonorrhœal infection, and has constant rheumatic pains in his lumbar region. Although the bladder is frequently washed out with antiseptic lotions, it seems to be almost impossible to get rid of the organisms from his urine. They disappear for a few hours after a thorough washing out, but reappear in the course of twenty-four hours.

After sepsis has been once fairly set up in the bladder, in my experience it is extremely difficult to cure it. We cannot pour into the bladder such a strong germicide solution as will at once permanently destroy the organisms, without at the same time injuring the bladder; besides, the organisms travel along the various ducts which communicate with the bladder, and are out of the reach of antiseptic solutions, and they keep up the sepsis in the urine by freshly infecting it after the bladder has been over and over again washed out.

The use of a very strong antiseptic solution, as that of bichloride of mercury, is apt to be followed by intense pain in the bladder and urethra; and I have observed that the organisms rapidly increase in the urine, after there have been symptoms of inflammatory action following the use of a too strong antiseptic solution in washing out the bladder.

It is best to use a weak solution frequently, rather than a strong one occasionally, in washing out the bladder. Inflammation of the mucous membrane of the bladder undoubtedly lowers the vitality of the protecting epithelial cells; and their wonderful resisting power is so reduced, that the parasitic organisms of sepsis have it all their own way in the struggle for existence.

With the object of preventing septic infection of the bladder, rather than curing it, about fifteen months ago I constructed an instrument which I call an aseptic catheter. This has answered extremely well, both in drawing off urine from the bladder, and in washing out the organ when sepsis has been established. An ordinary silver catheter, or any soft elastic instrument, can be made aseptic before it is used by the method I shall now describe.

The whole apparatus consists of two parts. The first is a tin can, holding about a quart, with a stop-cock (Fig. 2), to which is attached an India-rubber tube (Fig. 3), about three feet in length. This tin can is filled with an antiseptic solution, and is placed on a mantel-piece, or is hung up by means of the loop (Fig. 10) on a wall, or at the bedside, three feet or so above the patient lying on his bed. When the tap is turned on, a perfectly steady and constant stream of antiseptic lotion is given through the tube.

The second part of the apparatus consists of a modified catheter. If a soft gum elastic catheter, such as a No. 9 instrument, be used, there is screwed on to the end of the instrument a piece of light metallic tube, about an inch and a half in length. Projecting at right angles from this tube, and equidistant from its ends, there is another metallic tube, about half an inch in length, to which the India-rubber tube from the tin can is to be attached (Fig. 1). The India-rubber tube should be tightly screwed on to this projecting metallic tube in a perfectly air-tight manner. A piece of India-rubber tube, about an inch and a half in length, and tied very tightly in the middle, is used as a cap to fit on to the end of the instrument (Fig. 4). The catheter is now ready for use. Supposing it is perfectly clean outside, the catheter is seized near its eye-end, and held upside down over the basin which is to catch the urine. The tap (Fig. 2) is now turned on. A stream of antiseptic lotion at once pours through the eye of the catheter, having first driven out all the air in the instrument. No air can again enter the tube of the catheter as long as the liquid flows through it. The tap of the can is now turned off until the liquid escapes drop by drop through the eye of the catheter, which is then dipped into carbolic oil or other antiseptic unguent, and is at once passed into the bladder. The India-rubber cap is then twisted off the end of the instrument, and the urine will at once begin to flow. Immediately the urine ceases to flow, the tap (Fig. 2) is turned full on; and, the forefinger of either hand being pressed against the orifice of the catheter, the antiseptic lotion will then pour into the bladder (Fig. 7). As soon as the bladder is full of the antiseptic lotion, the forefinger is withdrawn, and the India-rubber tube is squeezed, or bent on itself, and then the bladder will pour out the antiseptic lotion (Fig. 8). Thus the bladder may be first emptied of its urine, and then washed out, over and over again, in the simple manner now described. On withdrawing the instrument from the bladder, the forefinger should be pressed against the orifice of the catheter so as to prevent the escape of fluid in the catheter. The

patient can wash his own bladder out just as easily as the surgeon can do it for him; and after the catheter is withdrawn from the bladder, it should be thoroughly cleansed by allowing the antiseptic lotion to run through it for a time. It is just as easy to use this catheter in the recumbent as in the vertical position of the patient.

This is the cheapest and simplest form of the apparatus, and only costs a few shillings. Should the catheter wear out, the metallic portion can be easily screwed on to a new soft elastic catheter.

A more perfect instrument is that represented in Fig. 9. It has an air-tight stop-cock just external to the projecting tube. In using this instrument, it is not necessary to have the small India-rubber cap to fit over the orifice of the catheter, and it is not necessary to press the forefinger against the orifice of the catheter, when the bladder is filling with the antiseptic lotion, as in the case of the other instrument. The stop-cock is tight when the instrument is first passed into the bladder, and it is simply turned one way when the urine is escaping from the bladder, and the other way when the antiseptic lotion is pouring into the bladder.

In the case of the ordinary metallic catheter, all that is necessary to do is to fasten on to the instrument a small metallic tube about half an inch in length, and of the same diameter as the catheter itself. This small tube, of course, communicates with the tube of the catheter, and is soldered on about one inch from the end of the catheter, on the upper or curved side of the instrument (Fig. 5). This modified instrument is used in exactly the same way as the one already described.

Mr. Gardner, surgical instrument-maker, South Bridge, Edinburgh, now makes up a box of several catheters with an adapter arrangement, by means of which a single washing-out instrument, as seen in Fig. 9, can be made to fit each and all of the catheters, though of different sizes.

With regard to the antiseptic lotion to be used, it is best to pour into the tin can a certain quantity of a cold and strong solution of a germicide. By the addition of boiling water to this solution, it can be diluted and warmed up to the proper degree for use, and it should be used at once.

The stomach, in disease, and in cases of poisoning, may be washed out in the most effectual manner, by attaching the tube of an ordinary aspirator to the free, or open end, of a large catheter, as in Fig. 9. The stomach being filled from the tin-can with an antiseptic lotion, or solution of an antidote for a poison, may be immediately washed out by the aspirator. In the same way, the pleural, or other cavity, may be rapidly and effectually washed out.

SOME REMARKS UPON ERGOT.

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THE recent investigations of Dr. R. Kobert upon the active principles of this drug, referred to last spring in the *BRITISH MEDICAL JOURNAL*, March 21st, 1885, p. 608, are in themselves of great importance to the medical profession. They show, for one thing, how incomplete our knowledge of the subject even now really is, and, for another, how absolutely essential it is to study the action of such bodies, separately, upon living animals.

Some time ago, there was a tendency, amongst certain members of the profession, rather to doubt whether the continued administration of ergot was capable of inducing those terrible epidemics of gangrene which history has handed down to us. While it is quite true that patients may take for some considerable time small doses of the various preparations of ergot without manifesting any dangerous or even unpleasant symptoms, yet most practitioners feel a certain amount of anxiety about these cases, unless they can be seen at pretty short intervals. There is really, however, no doubt that eating bread contaminated by ergot does produce gangrene (Taylor *On Poisons*, 1848, p. 538), as has been known since the sixteenth century (Pereira, *Elements of Materia Medica*, 1840, vol. ii, p. 604); and, quite recently, Dr. Meadows (*Medical Times and Gazette*, October 2nd, 1879, p. 397) met with a case in which unpleasant symptoms, such as flushing of the face, swelling of the eyelids, hand, and arm, were produced by so small a dose as half a drachm of the powder upon two separate occasions. Kobert (*Ueber die Bestandtheile und Wirkungen des Mutterkorns*, Strassburg, 1884, p. 14) has likewise obtained direct evidence that sphacelinic acid, when administered to fowls, caused dry gangrene of the comb and wattles, as well as of other parts of the body.

The toxic effect of ergot upon the animal system is not, however, confined to the production of gangrene. Pereira (*loc. cit.*