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ORIGINAL COMMUNICATIONS.

Catheterization of the Ureters.

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[SEE PLATES I AND II.]

I FIND so many of my professional friends come to Baltimore for the express purpose of learning to catheterize the ureter, that I feel it important, in response to a number of written requests also, to briefly describe the method of catheterization as practiced by myself and my assistants at the Johns Hopkins Hospital. I cannot resist the desire to again give a brief historical sketch of the development of this important addition to the gynæcological field.

The medical world has been in a better position to appreciate the importance of renal and ureteral pathology since the work of Rayer and Cruveilhier.

Prof. G. Simon was the first to indicate a way by which we might collect the urine as it came from the kidney by a catheter introduced into the ureter, thus eliminating vesical contamination and differentiating between the two kidneys both as to the quality and quantity of urine. Prof. Simon's method involved incision of the external meatus, followed by dilatation of the urethra sufficient to admit the index finger into the bladder, by means of which the ureteral orifice was sought out, and under its guidance a slender catheter introduced into the bladder and guided up the ureter.

The serious objections to this plan are that the catheterization thus becomes a rather formidable operation, and the stretching of the urethra in women to a sufficient size to admit a finger will certainly be followed by incontinence in a large number of cases. Pawlik, now professor in Prag, obviated all these objections by demonstrating landmarks in the vagina which serve to locate the ureters, and also by greatly improving the catheter. He thus made it possible to catheterize the ureters "free-hand," by sight alone, without any preparatory operation.

Prof. Sänger, of Leipzig, about this

FIG. 1.

Ureteral Catheter.

time demonstrated the fact that the terminal extremities of the ureters could readily be palpated per vaginam in almost all cases.

The writer has devised an improved ureteral catheter, sound and bougie (Figs. 1 and 2.) I have performed various ureteral operations, such as opening and draining the ureter into the vagina while treating ureteral stricture, ureterectomy, etc., but I have no claims of originality in this field which deserve to be mentioned along with the names above cited.

INSTRUMENTS AND ACCESSORIES.

2 Kelly's ureteral catheters.
1 small calibre female catheter.
1 syringe, with a graduated barrel, of 4 or 5 oz.) 120–150 c.c) capacity.
8 oz. of a decided blue aniline solution.
1 Sims' or Simon's speculum.
2 minim or cubic centimetre graduates of about 60 minim capacity.

Many patients can be catheterized without anæsthesia. The buttocks should be brought to the edge of the table, and the legs flexed upon the abdomen. The operator then catheterizes the bladder. This urine is set aside in a conical glass vessel for comparison with that to be obtained from the kidneys. The value of this will be seen when I say that I have repeatedly been able, upon drawing purulent or bloody urine from the bladder, to produce the same shade of red or yellow as that of the vesical urine by mixing pure urine obtained by the ureteral catheter from one kidney with the bloody or purulent urine drawn from the other. By careful palpation the ureters are located anteriorly through the vaginal wall, noting especially whether they are well forward under the bladder, or, as often found, abnormally far back in the pelvis.

The bladder is then distended with from 5 to 7 oz. (150–210 c.c.) of the aniline solution. The posterior vaginal wall is retracted with a speculum, exposing the anterior wall up to the cervix, while the bladder is being injected.

The object of this distension of the bladder is two-fold: in the first place it does away with all the rugosities of a contracted bladder, which hinder catheterization, if they do not render it impossible. The only rugosities left are the prominences on either side, through which the mouths of the ureters open into the bladder by a little slit, running obliquely backward in a line with the course of the ureters.

The second reason is well exhibited pictorially by Prof. Pawlik, who was the first to demonstrate that the curved folds which cross the anterior vaginal wall out to the lateral walls and around toward the cervix are valuable landmarks in finding the ureters, which lie parallel to and just

above them. These are appropriately called for this reason the "ureteral folds." They are brought out distinctly by moderate distension of the bladder.

An assistant should determine that the catheter is clear by placing the end in water and blowing through it without touching it with his lips. The metal plug, attached by a short chain to the catheter, is coated with a little vaseline and inserted in the outer end, thus keeping the aniline solution from filling the lumen of the catheter when it enters the bladder.

It is now evident that if clear or straw-colored fluid escapes through the catheter it must be urine, as the deep aniline color of the fluid in the bladder renders deception from that source impossible. When the catheter is introduced as far as the bladder, touch and sight assist in its further introduction into the ureter.

By turning its point forward and elevating the handle, a slight prominence is produced on the anterior vaginal wall. Throughout the manipulations of the catheter this is the constant guide to the vesical orifice of the ureter. The first step after the introduction of the catheter into the bladder is to try to locate the ureteral eminence by the sense of touch communicated from the tip of the catheter.

To this end the movements of the point on the anterior vaginal wall are closely watched as it plays over the base of the bladder. It is made to gently glide in a fore and aft direction from the neck of the bladder to cervix, in the median line, a little to one side, a little further out, and so on until it reaches the ureteral eminence, when it is distinctly felt to trip, jogging the thumb and finger in which the catheter is held.

The same movement is repeated until this point is exactly located. The attempt is now made to introduce the catheter into the ureter by carrying the handle to the opposite side, thus directing the point toward the posterior lateral wall of the pelvis, when the catheter is withdrawn slightly, and with its point still down, but turned a little more toward the side, is swept downward, outward and backward in the direction of the ureteral prominence. With each of these sweeping motions the catheter is rotated until the point is directed fully outward or slightly upward.

This movement, employed in engaging the catheter in the ureter, may very appropriately be called *fishing* for the ureter.

As soon as the catheter enters the ureter its course is fixed, and the tactile sense at once recognizes that it no longer lies free in the bladder as before. If the catheter is released for a moment the handle does not drop, but remains in a fixed position and forms an angle, of about thirty degrees, with a line projected from the urethra. The catheter should be introduced into the ureter until its point reaches the wall of the pelvis, when the plug is removed from the end. A catheter may now be introduced into the opposite ureter and both thus catheterized at the same sitting.

On account of the partial occlusion of the urethra by the first catheter the second is slightly more difficult to introduce.

If it is desirable to carry the catheter higher, even over the brim of the pelvis and up to the pelvis of the

PLATE I.

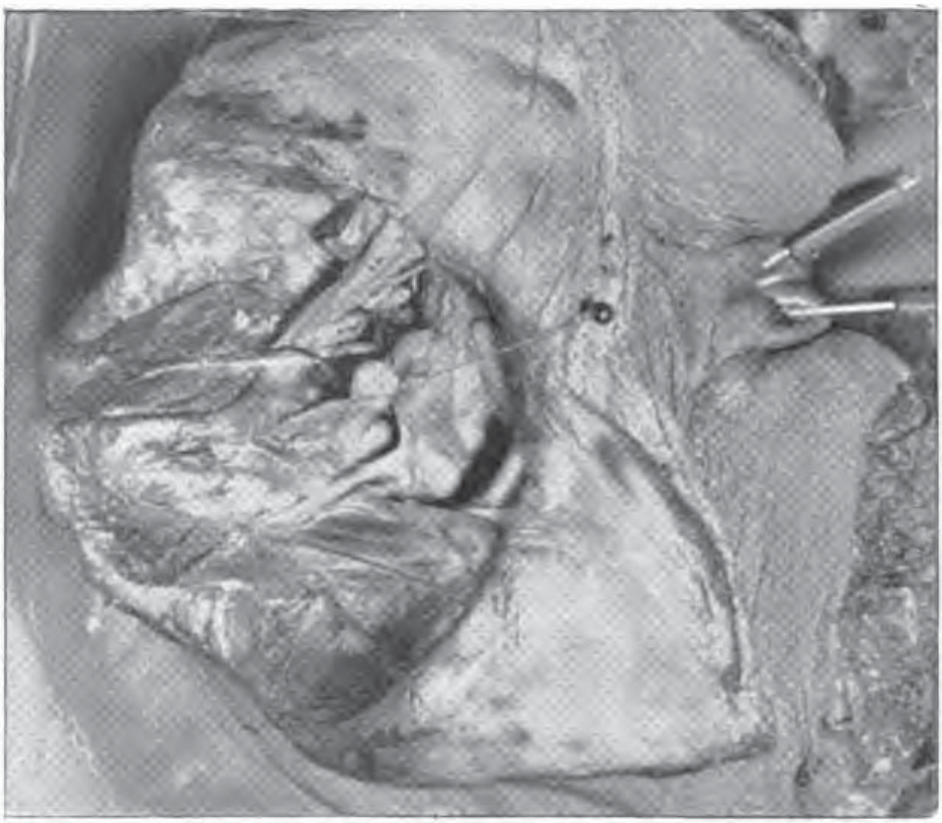

FIG. 3.—Dissection of ureters. Catheters in place in both ureters. Black headed pin transfixes fundus uteri.

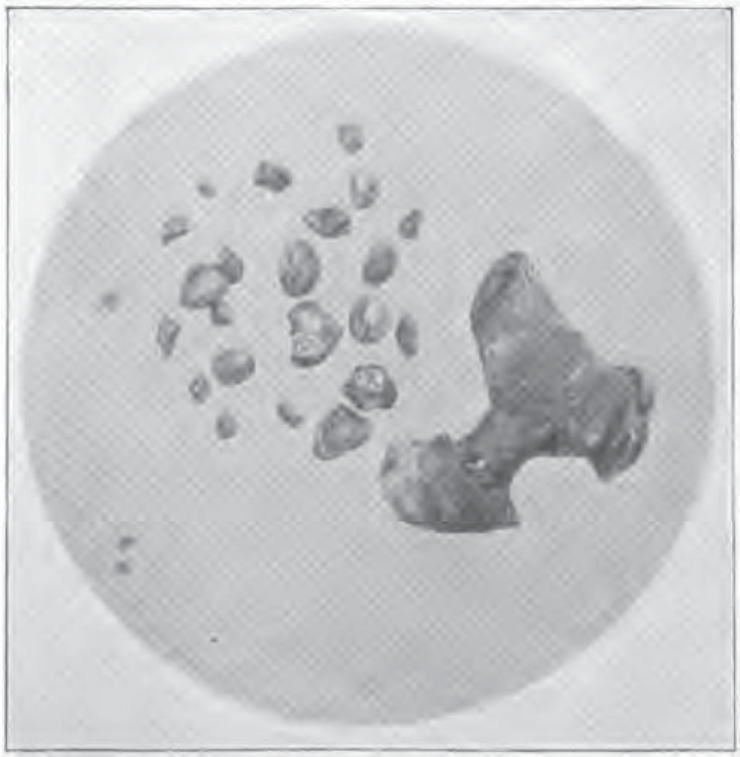

FIG. 5.—Stone obtained from right kidney; large fragment was exact cast of pelvis of kidney; small fragments broken off during manipulation of stone. Previous to operation pure pus was obtained from right ureter while normal urine flowed from the opposite ureter.

FIG. 2.—Ureteral bougies.

PLATE II.

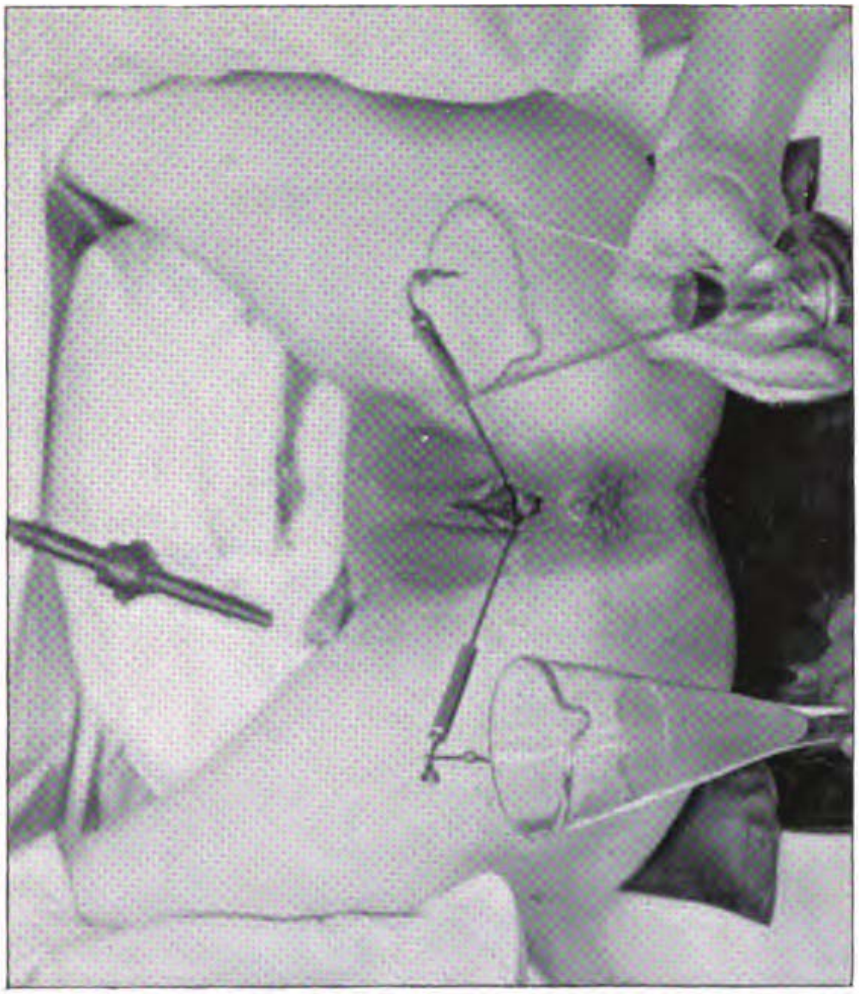

FIG. 5.—Stricture of left ureter demonstrated by catheterization. Catheter passed up above stricture followed by a rapid, continuous flow of urine, while urine escaped by drops in much less quantity from opposite side. Difference in quantity of urine obtained in the same time from both ureters shown in conical glasses.

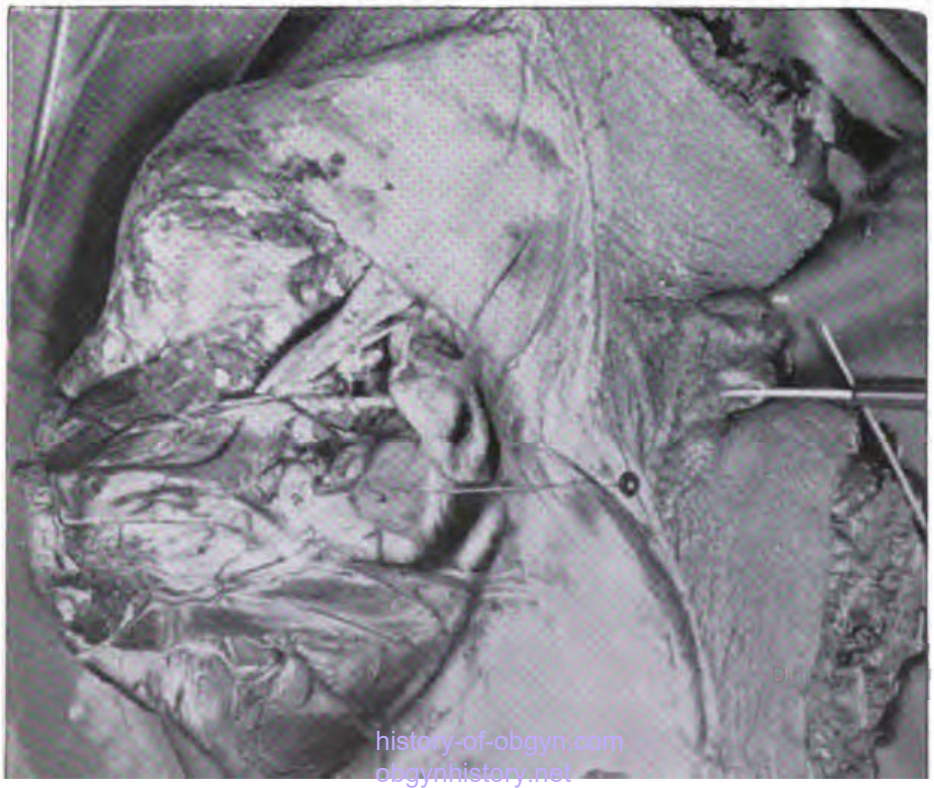

FIG. 4.—Dissection of ureters. Catheter introduced into left ureter. Black headed pin transfixes fundus uteri.