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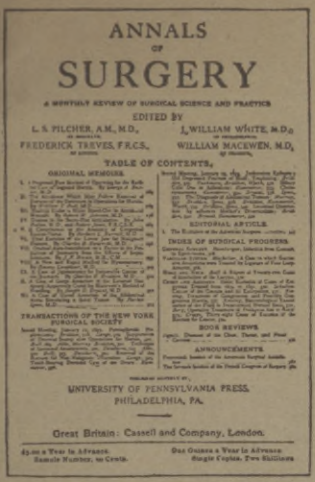
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URETERO-URETERAL ANASTOMOSIS—URETERO-URETEROSTOMY.

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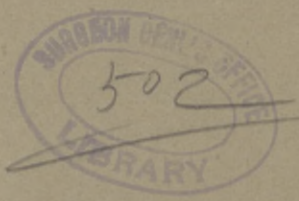
PROFESSOR OF GYNÆCOLOGY AND OBSTETRICS, JOHNS HOPKINS UNIVERSITY.



URETERO-URETERAL ANASTOMOSIS—URETERO-URETEROSTOMY.

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A CONSTANT dread of the surgeon dealing with myomatous uteri and other large pelvic tumors is the possibility of bringing the ureter into the field of operation and either cutting or ligating it.

The liability to injury is much increased when the ureter is displaced to one side or lifted out of its normal position by the tumor.

My attention was first called to this subject about eight years ago in the case of a little girl, about three years old, in whom I found a large dilated ureter coursing over the top of a retroperitoneal sarcoma. The tumor had lifted the ureter entirely out of the pelvis displacing it upward into the lower abdomen. The most marked displacement that I have encountered in my work since that time occured in the patient whose history forms the basis of this communication.

The patient, a mulatto twenty-five years of age, was sent to me by Dr. Cheston, of West River, Maryland. Three weeks previous to her admission to the gynæcological ward of the Johns Hopkins Hospital she had given birth to a still-born child in the eighth month. Immediately after this labor a large tumor was found lying transversely in the false pelvis from one iliac fossa to the other, and filling the whole lower abdomen. From its peculiar form some doubt was entertained in a consultation, concerning the nature of the tumor, as it was thought that it might be an extra-uterine fœtus. As the patient did not gain strength after her confinement, and seemed to be failing rapidly she was referred to my ward in the Johns Hopkins Hospital.

On examining her I found a large nodular mass about the size, and somewhat the shape, of a large fœtus at term, which filled both the true and false pelvis, and extended up above the umbilicus. The small cervix, the vault of the vagina and the bladder were drawn up into the abdomen and displaced to the left.

Her temperature on admission was 37.7° C. (99.8° F.), ranging from 37.8° to 38.9° C. (100° to 102° F.) up to the time of operation. Her pulse was full and strong, varying from 74 to 120. Urinary examination: Color amber, flocculent precipitate, acid, specific gravity 1018, albumin but no casts.

From the density of the masses and their relation to the cervix, the diagnosis of myoma uteri was made.

Hysteromyomectomy was performed May 1, 1892. The large myomatous uterus was exposed immediately beneath the peritoneum and lifted out of the abdomen through an incision twenty-four centimetres long. Both tubes and cornua uteri were drawn high up into the abdomen by the tumor, the round ligaments lying like guy-ropes close to the sides of the enlarged uterus. The uterus exhibited three myomatous masses, one about twelve centimetres in diameter at either cornu, and the third and largest, eighteen centimetres in diameter, partly within the pelvis, below the mass at the right cornu (Fig. 1).

The round ligaments and both ovarian arteries and veins were ligated near the brim of the pelvis, after which the broad ligament on the right side was opened and its peritoneal layers pushed to the front and back of the pelvis, thus exposing the uterine vessels on the floor of the pelvis. At this juncture a large flat vessel, one centimetre in diameter, resembling an engorged vein, was exposed for about seven centimetres of its length on the anterior surface of the lower pelvic mass. Its course was toward the cornu uteri, where it disappeared among the congeries of dilated veins (Fig. 1).

A careful examination of the vessel was made and its resemblance to a ureter spoken of, but as the upper extremity appeared to run directly into the tumor among the vessels, the conclusion was drawn that it was one of the enlarged veins so often seen in these cases; it was therefore doubly ligated and cut. The nature of the error was apparent as soon as it was severed, as its patulous lumen and thick walls showed it to be the ureter. This opinion was confirmed by passing a sound downward into the bladder, and upward over the pelvic brim toward the kidney. The ureter was enlarged to about four times its normal diameter, forming a well-marked hydroureter,

a condition not infrequently found resulting from the pressure of large myomata. On removing the upper ligature, about twenty cubic centimetres of clear urine escaped.

While deciding how to deal with this complication I continued the operation and ligated the uterine vessels on either side low down on the pelvic floor. The tumor masses, together with the body of

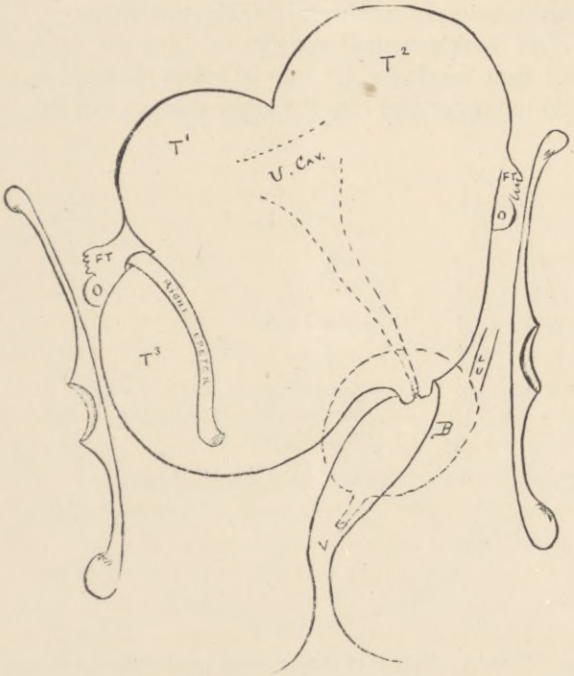

FIG. 1.—Coronal section of pelvis, T^1, T^2, T^3 myomatous uterus. Right ureter seen running over top of large myomatous nodule, T^3, vagina, bladder and cervix drawn upward and displaced to left, L. U., left ureter in normal position, FT., O., Fallopian tubes and ovaries.

the uterus, were removed by an incision through the cervix. The cervical canal was disinfected with pure carbolic acid and the flaps of the uterine stump approximated by a few silk sutures (Fig. 2).

I then turned my attention to the cut ureter. There were manifestly three possible modes of treatment, either to bring the upper end out through an opening in the flank or the middle line of the abdomen and thus establish a urinary fistula, or to remove the

right kidney, or to attempt the bolder plan of anastomosing the divided ends.

Although not aware that a successful anastomosis of the ureter had ever been accomplished in the human subject, I felt that I could undertake with considerable confidence a plan devised and practised successfully upon the dog by Dr. W. Van Hook, of Chicago, and which I had previously considered in this connection.

Dr. Van Hook's method consists in tying the lower end of the ureter and then making a slit into it below the ligature. He then invaginates the upper end into the lower through this slit.

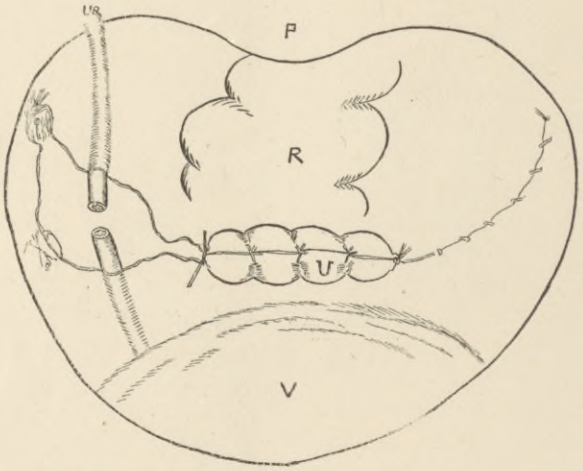

FIG. 2.—U. flaps of uterine stump approximated with interrupted silk sutures. Peritoneal layers of broad ligament approximated with continuous silk suture on left side; right side lying open, exposing cut ureter; R, rectum; V, vesica.

Proceeding according to this method, I first ligated the lower end of the ureter close to its cut extremity, and made a longitudinal slit one centimetre in length, in its anterior wall a half centimetre below the ligature.

A fine silk suture was then passed through the posterior wall of the lower portion from without inwards, a half centimetre below the lower angle of the slit; this was brought out through the slit and caught in the outer coats of the upper portion of the ureter two millimetres from its end and then carried back into the slit emerging

through the wall of the ureter close to the original point of entrance. (Fig. 3.)

A second suture was passed at a point directly opposite, catching the upper end in a similar manner.

By making traction on these sutures while holding the slit open the upper end of the ureter was readily invaginated into the lower. These sutures were snugly tied, and in order to avoid the risk of urine backing up through the slit, the edges were sutured to the intussuscepted ureter with about ten fine silk interrupted rectangular sutures, catching only the outer coats. The anastomosis was thus completed. (Fig. 4.)

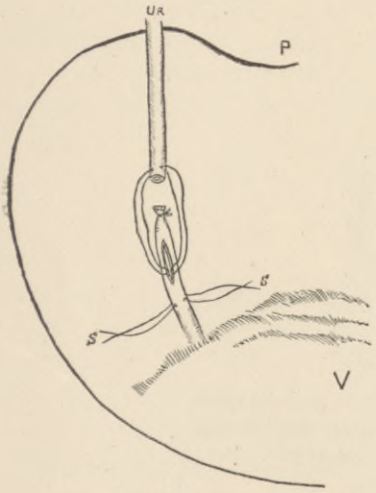

FIG. 3.—Right half of pelvis. Traction sutures, S. S., in place ready to invaginate upper end of ureter into ower.

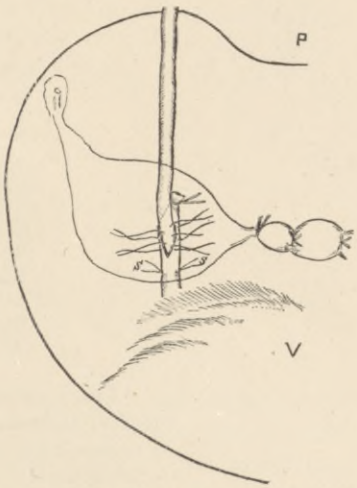

FIG. 4.—Upper portion of ureter invaginated into lower; traction sutures S. S., tied; lateral fixation sutures in place.

The loose peritoneum in the anterior part of the pelvis was now drawn over the field of operation and attached to the posterior surface of the stump and the broad ligaments by a continuous suture, except at the point where the ureter was united. Here two pieces of iodoform gauze were laid over the anastomosed ends and brought out at the lower angle of the abdominal wound, to insure drainage of the urine in case the operation was unsuccessful. The remainder of the abdominal incision was closed in the usual manner. During the first day

after operation the patient was catheterized every few hours to prevent the possibility of the urine in the bladder backing up against the anastomosis. On the second day she passed urine voluntarily, after which the catheter was no longer used. At no time was there the slightest urinary odor on the dressings, and on the third day the gauze drainage was removed. The sutures were removed on the eighth day. Union *per primam* throughout. The abdomen remained flat, the patient had no nausea, and the convalesence throughout was uninterrupted.

Albumin was present in considerable quantities before the operation, but at no time following the operation was there more than a

FIG. 5.—Sketch from alcoholic specimens of anastomosed ureter from the dog. Lumen split and held open by pins. Point of anastomosis in centre.

trace, and the urinary record indicates only a faint trace at the time of her discharge. The amount of urine excreted was less than 500 cubic centimetres for nine days ofter operation, not allowing for an uncertain quantity lost at stool. On the twenty-seventh day after operation, she was excreting 1080 cubic centimetres, and on the forty-second day 1120 cubic centimetres.

She was allowed to get out of bed on the seventeenth day, and was discharged in excellent health six weeks after the operation.

I reported this case at the Johns Hopkins Hospital Medical Society, October 9, of this year. Dr. Bloodgood, Resident

Surgeon of the Hospital, was happily able to illustrate my remarks graphically by producing at the same meeting of the society the anastomosed ureter of a dog, operated upon by him in a similar manner two and a half months previously. In this case the function of the ureter was not in the least interfered with. Its lumen was not lessened at the point of anastomosis, there was no dilatation or hydroureter above the anastomosis and there was no affection of the kidney of that side.

I am indebted to Dr. Bloodgood for the following notes and sketches which he has placed at my disposal:

"*Anastomosis of the Right Ureter in a Dog.*—Exhibition of the kidney and ureter removed two and one-half months after the operation. No dilatation of upper portion of the ureter, no stricture at the anastomosis and perfect restoration of the continuity of the canal and mucous membrane." (Fig. 5.)

FIG. 6.—Traction sutures in place; these sutures pass through posterior wall of ureter but once.

"Operation, July, 1893.—Large dog; ether and morphia narcosis. A long incision was made in the right side, opening the abdominal cavity. The peritoneum was torn open, exposing the right ureter. The ureter was lifted from its bed and severed ten centimetres from the bladder."

"After ligating the lower end a longitudinal incision was made in its ventral wall 1.5 centimetres long, beginning .5 centimetres from the ligature. Two black silk sutures were passed through each lateral wall of the lower ureter through the longitudinal incision, and out through the lateral wall." (Fig. 6.)

"Using these two sutures as tractors and with the aid of a probe the upper ureter was drawn into the lumen of the lower, through the longitudinal incision and the sutures tied."

"Two additional sutures were passed through the lateral walls (not including the mucous coat) where the ends overlapped (Fig.

7). The anastomosed ureter was dropped back into its bed and the abdominal wound closed. The dog made a perfect recovery, without untoward symptoms."

"October 7, 1893, dog was again etherized and the kidney and ureter removed through a median incision. The kidney was normal and the upper end of the ureter was not dilated. The lower portion

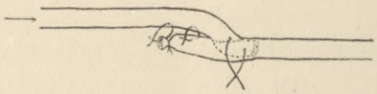

FIG. 7.—Ureter anastomosed; traction sutures tied and two fixation sutures in place ready to be tied.

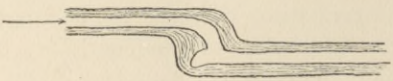

FIG. 8.—Longitudinal section of ureter showing new lumen and diverticulum.

ended in a blind sac at the point of ligature. The upper portion anastomosed with the lower in a slight curve. There was no stricture and the mucous membrane was continuous." (Fig. 8.)

"There was some difficulty in invaginating the upper portion into the lower; to obviate this a long incision was made. Bleeding from the artery accompanying the upper portion of the ureter caused some inconvenience."