riorly extended into the bladder, dividing the posterior wall of the bladder transversely. The mucous edges of the vagina were dissected up a little all along the incision, for the purpose of obtaining a narrow annular strip of denuded surface. The mucous membrane of the upper edge of the incision into the bladder was then attached to the free edge of the mucous membrane of anterior wall of vagina, by means of a continuous catgut suture. The lower edge of the bladder wall, however, was drawn out and sutured to the upper edge of the vaginal mucous membrane of the posterior wall, thus forming the bladder diverticulum, using interrupted catgut sutures. The vaginal mucous membrane of the anterior wall was now attached to vaginal muccsa of the posterior wall as well as to the sides by silkworm-gut sutures, covering in the bladder sutures and completely closing in the upper conical portion of the vagina into the bladder. The urine from now on was passed by the bladder without much discomfort and in the course of a week or so the bladder had resumed its function, just as before. When the silkworm-gut sutures were removed, a small fistulous opening formed, by which some of the urine escaped per vaginam, but a few sutures closed that up permanently. The patient was discharged from the hospital perfectly cured January 23 and has experienced no further trouble from that source, having enjoyed very good health ever since.

Before discharging her a cystoscopic examination of the bladder was made. The bladder was divided into two compartments, a large one, consisting of the bladder proper and a small one, the upper portion of the vagina, and between these a free

Fig. 7.—View of interior of bladder as seen through cystoscope. The small pouch represents the upper segment of vagina; it contains ureteral orifices. The large pouch is fundus of bladder.

communication exists. The bladder mucous membrane was of normal appearance, the vaginal mucous membrane seemed somewhat reddened. I have had no opportunity of making another cystoscopic examination since, as I had hoped to do. It would be exceedingly interesting to learn whether the vaginal epithelium has been supplanted by vesical epithelium, a transformation which does not seem impossible under the circumstances.

REMARKS ON THE METHOD.

The operation has been so satisfactory that it can certainly be recommended as the best procedure in similar cases. It differs entirely from the old colpocleisis, because it establishes a large free communication between the upper portion of the vagina and bladder; it unites accurately the edges of the mucous membrane of the bladder with those of the vagina; it leaves the vagina proper practically intact, as it only includes the vaginal fornices and that part formerly occupied by the cervix, and does, therefore, not interfere with cohabitation. The operation might be termed a cystocolpocleisis, bringing together as it does an opening made in the bladder with that part of the vagina just below the insertion of the ureteral fistula.

CONCLUSIONS.

The failure of the implantation after holding at least five days must be due to the catgut, which was exclusively used. After it gave way the tension was, no doubt, great enough to separate the freshly-united ureter and bladder. This experience should teach us the lesson to use only silk for at least the muscular and serous sutures when there is the least tension, as the durability of catgut is always a somewhat uncertain factor. The very tight silk ligature which had included the left ureter, had evidently damaged the vitality of that structure to such an extent that necrosis of its wall took place, causing the urinary fistula. Fortunately the gauze drain passed from the pelvis into the vagina kept a way open for the urine to escape, thus unquestionably saving the patient's life.

The unreliability of catgut for bladder implantation of the ureter, especially when tension exists; the danger of necrosis of the ureter when compressed beyond a few hours, and the importance of vaginal gauze drainage in injuries of the ureters are a few of the practical lessons which have particularly impressed me in this unique case.

STRICTURE OF THE URETER.*

HOWARD A. KELLY, M.D.

BALTIMORE.

It is not a little strange that although enough has been written about strictures of the urethra to fill volumes, practically nothing, and next to nothing practical, has been said of strictures of the ureters.

A stricture of the urethra is the occasion of a damming up of the urine in the natural vesical reservoir, and as soon as such an accumulation reaches a point beyond physiologic limits the desire to urinate becomes so imperative that relief must be found either by natural or by artificial means. If a urethral stricture repeatedly asserts itself in this way the victim hastens to a surgeon and continues under his treatment until some measure of relief is secured. It is quite otherwise with a stricture of the ureter, which may develop gradually and in which the signs are often not at all urgent; the lumbar pain, due to the urine forced back into the kidney, is often misinterpreted and temporizing methods are instituted until the kidney is thrown out of function, and, when at last an operation is determined on, the kidney, being the organ most in evidence, is victimized and the surgeon announces that he has operated successfully on a hydronephrosis or on a pyonephrosis. Not at all; in many instances he has simply operated for one of the late sequelæ of a stricture of the ureter, and, contrary to the true teaching of scientific surgery, he has been content to treat the effect, while he leaves the accessible cause untouched.

It is my earnest desire to-day to insist on more searching and more thorough investigation as well as on better discrimination in handling diseases of the upper urinary tract, in which term I include the entire urinary apparatus above the bladder.

USE OF TERMS: OBSTRUCTION AND STRICTURE.

A stricture of the ureter, properly so called, is a narrowing of the lumen of the ureter produced by an affection of the ureteral walls. Such a stricture forms an obstruction to, and impedes the flow of the urine just in proportion to the degree of the narrowing. A stric-

*Read at the Fifty-third Annual Meeting of the American Medical Association, in the Section on Obstetrics and Diseases of Women, and approved for publication by the Executive Committee: Drs. A. H. Cordier, W. E. B. Davis and Henry P. Newman.

ture in this sense is but one of the various forms of obstruction of the ureters, but there are many obstructions which are not strictures, although all obstructions produce a narrowing of the ureteral lumen.

Obstruction is the generic term for any hindrance to the downflow of the urine, while stricture is specific in its designation, being limited to intrinsic narrowings due to disease of the ureteral walls. In order to retain a clear impression of the group of cases we are about to study, it is most important to emphasize this distinction at the outset.

The ureter may be obstructed from within by something, such as a calculus choking its lumen, and thus producing the same effect as a stricture, by holding back the urine. It may also be obstructed from without by a fibroid or ovarian tumor pressing on it to such an extent as to prevent the transmission of the urine on to the bladder. In other cases the obstruction may be caused by a twisting of the kidney, which effectually impedes the outflow of the urine. Such obstructions as these, however, can not be called strictures, unless the walls of the ureter become, in time, organically affected, so that permanent narrowing results and remains even after the restoration of the kidney to its normal site and posture.

The difference between true strictures and other obstructions may be thus defined. If you remove an obstruction by taking away the tumor, undoing the twist, or lifting the calculus, the urine flows on unhindered; but you can not remove the stricture without either stretching or resecting the affected portion of the ureter.

The importance of a stricture lies in its interference with function, and the resulting obstruction offered to the downflow of the urine. A slight narrowing may produce no backing up immediately, but as the constriction progresses the urine is detained and the ureter begins to swell until from a little white cord it forms an elongated flaccid sac filled with urine, one centimeter, or two to three in diameter. At first it retains its own course, but as it becomes more distended it bulges out toward the flank, and any vessel traversing its lumen may cause a prominent bellying over and further obstruction.

Pari passu with the distension of the ureter goes the distension of the renal pelvis and the formation of a hydronephrosis, at first of lesser then of greater and yet greater degree. The retention of the urine above a stricture changes the balance of pressure in the kidney, and in this way less and less urea is excreted from the affected side. A ureteral stricture is rarely bilateral, so that the opposite kidney remains unaffected, and is fully able to maintain the balance of the economy by an increased excretion of urea.

The importance of recognizing a ureteral stricture is enhanced by the fact that in many instances the affection is susceptible of direct treatment and relief, whether early or late in the progress of the disease. Here I would pause to reiterate and to emphasize the importance of a correct name. We must, with better discrimination, call many of our cases hitherto labeled "pyonephroses" and "hydronephroses" by the proper name "stricture of the ureter" and then describe the secondary changes produced by the accumulation of urine or pus in the upper urinary tract. If the disease is thus properly recognized and classified as a stricture, the stricture will then be sought out and treated, while as long as such names as "pyonephrosis" and "hydronephrosis" are current, just so long will surgeons be content to operate for the relief of the accumulation, or to sacrifice

the kidney, neglecting the true cause of the disease. The physiologic value of such an obstructed kidney has been repeatedly demonstrated; for, even after the blockade has existed for many months the kidney may resume a remarkable degree of activity, and if it is the only kidney it may still suffice to prolong life.

In one instance, for example, I removed a large right pyonephrotic kidney with a calculus, and at a later date the opposite kidney, which had been slightly infected from the first, grew so bad that the urine was simply a mass of pus, so foul the nurse could not stay in the room with an open vessel. I washed the kidney out repeatedly when the pus and infection gradually lessened, and the patient is to-day apparently well and active. Another patient had a large right hydronephrotic kidney, a mere shell as big as my two fists, with milky urine and a colon bacillus infection; there was no secretion from the left side at all. After the removal of a stone from its pelvis she continued to live for two years on this shell, secreting about 80 ounces of urine a day.

CLASSIFICATION OF STRICTURES.

Strictures may be grouped according to their, *a*, location; *b*, extent; and *c*, cause.

The location of a stricture may be at any point in the ureteral tract from the vesical orifice up to the renal pelvis, the commonest point being at the vesical end. I have seen but one case of well-defined stricture at the renal end, and one case of stricture of the abdominal portion of the ureter at about its middle on the psoas muscle; all other cases have been at the terminal portion, that is to say in the anterior part of the true pelvis, somewhere along the pelvic floor.

The extent of the stricture may vary from a narrowing of the ureter limited to one particular area not more than a few millimeters in length, to one several centimeters or more in length and cylindrical in form. I have seen but one case of stricture limited to a small area. In that the right ureteral orifice was almost closed by an inflammatory process involving the vesical wall surrounding the ureter, and as soon as I discovered the minute opening in the puffy injected vesical mucosa and introduced a catheter, a free flow was established and the pent-up fluid escaped.

Strictures are caused by an inflammation in the ureteral walls produced by the commoner pyogenic cocci, by the gonococcus and by the tubercle bacillus. The commonest form of inflammation is that due to the tubercle bacillus, and the rarest in my experience in women is due to the gonococcus.

SYMPTOMS OF STRICTURE.

The symptoms produced by a stricture in the early stages are those of the associated infection which is rarely localized in the ureter until the disease is well advanced in the bladder or in the kidney. The symptoms may then at first be those of a vesical or of a renal inflammation. I know of no particular symptom diagnostic of stricture even in the advanced cases; it is, however, safe to assume that in a large percentage of cases of advanced renal infection a ureteral stricture will be found.

The diagnosis is made by a direct investigation of the urinary tract by: *a*, palpation; *b*, inspection; *c*, catheterization.

The pelvic portion of the ureter is the one part which is easily accessible to palpation, and in a woman a stricture in this portion can often be felt in a vaginal examination. The ureter, lying just above Pawlik's folds in the vagina, feels like a distinct, more or less rigid cord;

it is sometimes shorter than the sound ureter and its vesical orifice may be drawn well over to the side. A well-defined difference even between the two ureters in a case of pyuria is always suspicious. As I write this paper I have a case on hand in which there was an apparently causeless pyuria; the turbid urine remained normally acid and no organisms grew on the ordinary media, but on making a vaginal examination I found that the right ureter, while hardly enlarged, was still decidedly more distinct and cord-like than the normal left ureter. Although no renal symptoms had been noted since the disease began some four years ago, I made a preliminary diagnosis of involvement of ureter. A vesical examination revealed a normal left ureteral orifice while the right orifice was in the center of a puffy, deeply injected area. A fine ureteral catheter showed the presence of one of the tightest strictures of the vaginal portion of the ureter I have ever felt; the catheter could only be pushed up when stiffened with a strong stylet, and with considerable force. After the stylet was withdrawn, a measurement of the pelvis of the kidney showed that its capacity had been enlarged to 30 c.c., and upon injecting that amount of fluid there was no reflux of the aniline solution into the bladder as the catheter was so tightly gripped by the stricture.

When the lower end of the ureter is much diseased it often feels like a cord as thick as a pencil, and sometimes it is irregular and nodular. All the cases of this kind I have seen have been instances of tubercular ureteritis.

The upper ureter in men and women is also palpable through the air-distended rectum. To feel this portion distinctly, wash out the bowel, put the patient in the knee-breast posture, and let air into the bowel; when the latter is fully distended, turn the patient over again into the dorsal position, keeping the hips elevated, and then palpate the ureter up along the lateral and the posterior pelvic wall.

DIAGNOSIS OF STRICTURE.

In making a diagnosis of stricture of the ureter, I would emphasize the following important points:

The ureteral area is sometimes swollen, deeply injected or surrounded by areas of ulceration; the opening is often obscured so that it appears like a mere dimple in the midst of a large cushion of puffy mucosa, or its presence is merely indicated by a few radiating lines on an elevated ridge of vesical mucosa. This ridge is formed by the expansion of the bladder giving unusual prominence to the rigid thickened ureter. In attempting to catheterize such an orifice, difficulty is often experienced in introducing the catheter; a small-sized catheter must, as a rule, be used, one not over two or two and a quarter mm. in diameter; the difficulty of pushing the catheter up the ureter is so great at times that the surgeon fears perforation of the ureteral wall; there is often an immediate flow of urine as soon as the stricture is cleared, and the urine sometimes even commences to dribble out of the catheter before the stylet is withdrawn. On removing the stylet the urine often escapes in a steady uninterrupted stream. If the catheter is pushed on up into the kidney, the dilated renal pelvis at once begins to empty itself of its retained urine, discharging 15 to 30 or more c.c. of urine which sometimes contains pus, and a considerably diminished amount of urea. Its reaction is feebly acid or else alkaline. After emptying the kidney, fluid may be forced into it until the pelvis is distended, which will be recognized by the resistance appreciated by the fingers in

squeezing the bulb, as well as by the renal colic which begins to come on with the slightest overdistension.

In cases where there is no stricture the slow injection of the kidney, using a small-sized ureteral catheter, is not attended with pain, as the solution flows down the ureter at the side of the catheter and escapes into the bladder as rapidly as it is injected. If an aniline solution is used and a catheter is put into the bladder, it is easy to tell the moment the fluid runs down the ureter by its appearance in the vesical catheter. In cases of stricture, on the contrary, there is, as a rule, no such reflux and the urine flowing from the bladder continues uncolored, even when the pelvis of the kidney has been well distended. If after emptying the pelvis of the kidney, the ureteral catheter being still *in situ*, the patient is made to bring her body into the erect posture while still on her knees, upon withdrawal of the catheter at each successive level down to the stricture there is an escape of a few c.c. of urine. The catheter used in this way taps the ureter at different levels and demonstrates clearly the dilated condition of the ureter as well as the presence of the stricture below. As the tip of the catheter enters the stricture, the flow ceases. When the end of the catheter lies free in the midst of a considerable quantity of urine, the act of coughing, or voluntary strain increases the flow from the end.

The most characteristic of all the signs of stricture of the ureter, and one complementary to the obstruction encountered in introducing the catheter, is the strong bite of a tight stricture felt upon withdrawing the catheter; the catheter may be held so firmly that any slight traction only serves to displace the ureter a little *in toto* without causing any change in the relative position of catheter and ureter. The withdrawal of the catheter in some instances yields much the same sensation as pulling it out of a vise.

If one is careful to note the point at which flow of urine ceases and then to mark the point at which the stricture is cleared, and the catheter is no longer held in its bite, an approximate idea of the length of the stricture may be gained. To do this I inject the kidney and ureter with the catheter so as to have the distended upper urinary system full. I then slowly but steadily remove the catheter, watching the flow from the end all the while; the moment there is a sudden check in the flow, which is not resumed, I measure or mark the catheter at the external urethral orifice, or else measure the length of the catheter outside of the urethra. By knowing this measurement it is easy to calculate the distance from the internal ureteral orifice to the upper end of the stricture, by deducting the already known and easily measured distance from the urethral orifice to the ureteral orifice. I next measure in the same way the point at which the catheter is felt to be freed from the bite of the stricture; this measurement, compared with the first, gives with fair accuracy the length of the stricture. The first measurement must be made to the eye in the catheter which controls the flow and the last to the point beyond the eye where the end begins to contract.

TREATMENT.

The proper treatment of a stricture is a matter of the utmost practical importance, as almost all cases sooner or later need active measures of relief, which, if appropriate, may save the patient from undergoing a serious operation at a later stage of the disease.

In order to decide on the proper course of treatment a careful and correct diagnosis is indispensable. This diagnosis must rest on precise information on two important points. First, as to the site, the extent, and the

character of the stricture, which demonstrates the condition of the strictured area, and its amenability to treatment; second, as to the state of the urinary tract above the stricture, which shows the extent of drainage, and the possibility of relieving it in any measure by palliative treatment.

BY DILATATION.

The simplest and most satisfactory method of treating stricture is dilatation by means of bougies; but, unfortunately, when the stricture is a tight one, due to much thickening in the walls of the ureter, the effects of the dilatation are often only temporary. I cite a few of the more fortunate cases, selected from a large number.

CASE 1.—Eight years ago a patient came to me with a tight tortuous stricture of the left ureter beginning at its vesical orifice, and extending for about two centimeters. Examination of the urine by Dr. Barker showed diplococci which had the typical appearance of gonococci. I dilated this stricture with metal dilators, and washed out the urinary tract above with bichlorid of mercury and nitrate of silver, until the urine, previously full of pus, became clear, and was reduced, in the amount accumulated in the upper tract, from 150 centimeters to less than 100. Under this treatment the patient was so entirely relieved that she returned home contented and has since remained in perfect health.

CASE 2.—Mrs. C., aged 37 (J. H. H. 9288), December, 1901. Pain in the lower left side of the abdomen, with occasional hematuria, the latter dating from catheterization after the uterus was curetted four months previously. On attempting to catheterize the left ureter the catheter was strongly grasped as it entered the orifice, and could not be passed upward except by leaving in the stylet. The ureteral orifice was dilated several times with metal dilators up to five millimeters. No culture was obtained from the urine which was normal. Three months later the patient was catheterized and no stricture was found.

CASE 3.—Miss P., aged 28 (J. H. H. 7936), June, 1900. Chief symptom hematuria, occurring intermittently for three years. No pain on urination, nor increased frequency; occasional pain and slight tenderness on deep palpation in the left groin. Introduction of a wax-tipped catheter showed indefinite scratch-marks on two occasions. The catheter was grasped firmly as in a stricture. On operation no stone was found in the kidney. At a second operation three weeks later by the extra-peritoneal incision, the ureter was opened and a wax-tipped catheter passed down to the bladder, where a stricture was found in the last two centimeters. This stricture was dilated up to three millimeters by metal dilators passed downward. During convalescence the dilatation was continued from below upward. Complete recovery.

CASE 4.—In another case I dilated the ureter in the opposite direction, that is to say, from above through the renal pelvis. It was that of a man 42 years of age who had had his first attack of pain Jan. 8, 1879, when he was thought to have intussusception; following this he had periodic attacks of nephritic colic involving the left kidney and extending to the bladder. His condition had been diagnosed as stone in the kidney and muscular pain. I operated upon him June 12, 1900, and found a large flaccid pelvis of a hydronephrosis caused by a tight stricture about 2.5 cm. below the kidney which would not admit a small probe 2 mm. in diameter. Finding myself unable to resect this portion of the ureter, which was long and narrow, I incised the thickened renal pelvis, exploring carefully for stone; found none and then dilated it. Beginning with a sound of 1 mm. in caliber, I gradually used larger sounds until one 5 mm. in diameter was passed and this was fortunately done without any apparent rupture of the ureter. The incision into the renal pelvis was closed with silk and the patient made a good recovery and has remained perfectly well and free from pain ever since.

BY CATHETERIZATION AND LAVAGE.

Simple catheterization of the ureter, and washing out of the kidney will sometimes give relief, as in the following case:

CASE 5.—Mrs. C., aged 60 (J. H. H. 8753), May, 1901. Operated on for large ovarian cyst, which was adherent to the uterus, bladder, intestines and peritoneal wall. The bladder was opened accidentally and closed with catgut. The ureter below the pelvic brim was 6 mm. in diameter and above the pelvic brim 2 cm. The kidney was felt as a large cystic mass, and was easily emptied by pressure, 320 cubic centimeters of urine flowing into the bladder. Examination of urine withdrawn by catheter showed a specific gravity of 1015, a distinct trace of albumin, a few irregular small epithelial cells, but no pus cells. The wound healed by primary intention, but on the 13th day a clearly defined mass was discovered in the hypogastrium. No bladder symptoms were complained of, but pus cells were found in the urine at the end of twenty-four hours. On the 15th day the temperature, which had been normal, rose to 102 F., with severe pain in the right side accompanied by a large fluctuating mass in the right flank. On catheterization 270 cubic centimeters of purulent urine was collected in thirty minutes. Boric methylene blue was then allowed to run into the kidney, which was found to hold 350 cubic centimeters without any return, showing the presence of a stricture at some point. Rapid improvement with a drop in temperature followed the irrigation. The kidney was washed out about twice a week for nearly three weeks with a solution of formalin 1-5000, a small catheter $1\frac{3}{4}$ millimeters being used, and the formalin allowed to escape past the catheter into the bladder. At the last irrigation there was still some pus in the urine, but the patient had no symptoms, and the kidney held only 170 cubic centimeters of the formalin solution as compared with 350 at the first washing.

The following is a remarkable case of temporary stricture, easily overcome by passing the catheter but once:

CASE 6.—Mrs. P., aged 37 (J. H. H. 7375), November, 1899. Operated on by Dr. Miller for extensive pelvic inflammatory disease. The right ureter was clamped in the attempt to catch a bleeding uterine artery. The ureter was tied in two places but these ligatures were cut later, and the ureter found on examination to be uninjured from the bladder to the brim of the pelvis. Soon after recovering consciousness the patient complained of severe pain in the region of the right kidney, and there was an appreciable diminution in the amount of urine excreted during the next twenty-four hours. At the end of that time I catheterized the right kidney under chloroform, on account of suspected ligation. The introduction of the catheter was followed by an immediate flow of urine in moderate amount. No stenosis was then present. The relief from pain was immediate, and the patient made a good recovery.

BY FREEING THE URETER FROM ADHESIONS.

Where the ureter is involved in inflammatory tissue it may sometimes be sufficient to dissect it out of its bed of adhesions and set it free as illustrated in the following case:

CASE 7.—Patient 57 years of age, who had for many years been a constant sufferer from obscure pains in the left loin and hip. I injected the left kidney with fluid through a ureteral catheter, producing an attack of renal colic and brought on an attack of pain similar to that from which she had been suffering. After an operation suspending the kidney, which failed to relieve, an incision in the left loin revealed the ureter buried in a mass of inflammatory tissue in the midst of abundant fat for an extent of about 3 cm. at a point lying on the psoas muscle about half-way down to the brim of the pelvis. I freed the ureter from its bed and closed the wound; she made a slow recovery, but is now, over two years after the operation, completely relieved of her old trouble.

BY RESECTION.

Resection of the ureter is a possible form of treatment, but one which can rarely be used.

BY EXTIRPATION OF THE TRACT.

In cases of stricture due to tuberculosis the best line of treatment is not conservatism, but extirpation of the diseased kidney, and in some cases the ureter as well. The latter operation I have called nephro-ureterectomy or uretero-nephrectomy, according to whether the ureter or the kidney is removed first. The following case illustrates this mode of treatment:

CASE 8.—Miss R. began to suffer at the age of eighteen with an irritable bladder. I saw her sixteen years later, and felt a thick hard nodular left ureter through the vagina. The left ureteral orifice was puffy and everted, so that a catheter was passed in with difficulty; after carrying the catheter to a point back of the broad ligament there was a sudden escape of pale lemon-colored urine which flowed steadily until it filled a large beaker, while during the same period of time only a few cubic centimeters of dark-colored, acid urine was collected from the opposite side. The urine from the left side was infected, containing pus and tubercle bacilli. On March 30, 1893, I did a left nephro-ureterectomy, removing the ureter down to the pelvic floor. From this she recovered, and has since had no return of trouble.

Figure 1.

BY TRANSPLANTATION.

Amputation and implantation of the bladder is useful in some cases, especially where the opposite side is diseased and yet is capable of doing some work. One of my most recent cases was that of a patient of Dr. Lutz of Glen Rock, Pa.

CASE 9.—The patient, aged 30, had an area of ulceration around the right ureteral orifice, and on introducing a catheter it encountered an obstruction which could not be overcome. On making another attempt, two days later, the catheter doubled on itself just within the ureteral orifice (Fig 1). I then introduced one of my silver ureteral catheters, and succeeded in clearing the stricture in the ureter, when there was an immediate free and steady flow of pent-up murky urine. Although considerable pus was present no tubercle bacilli could be found. Believing the case, therefore, to be one of inflammatory thickening, with the aid of my first assistant, Dr. Hunner, I anastomosed the left ureter into the bladder, after opening the abdomen and cutting the ureter off at a point back of the broad ligament, above the stricture, where it was dilated. She did fairly well after this operation and returned home, but a few weeks later, during my absence, Dr.

Hunner was called to see her for a serious abdominal illness. On opening the abdomen, he found a most extensive disseminated tuberculosis starting from the affected ureter. At the present time she is recovering from this operation, but it will shortly be necessary to remove both ureter and kidney.

I can not pass by this case without adverting to the lessons it teaches. In the first place, in my experience, all large nodular ureters are tubercular; in the second place, the tubercle bacilli may be extremely difficult to find even when the disease is advanced. Tuberculin ought to be used in all these cases.

BY DIVISION OF THE STRICTURE.

I add the following case, occurring in the practice of Dr. Hugh H. Young,* which is of special interest as showing the association of stricture of the ureter with calculus, and also as suggesting a useful method of treatment for cases in which a stricture at the lower end of the ureter is unusually light.

CASE 10.—The patient, aged 27, had had attacks of renal colic for twenty-five years. On catheterization an impassible obstruction was met one or two centimeters above the ureteral orifice, and no urine was obtained from the left side. An x-ray photograph showed a shadow about as large as the thumb-nail, in the region at the end of the left ureter. On operation the ureter was found to be greatly dilated, being about one inch in diameter. A calculus 2 by 1.5 cm. was impacted at the junction of the ureter with the bladder and was removed. (See Fig. 2.) Before closing the ureter an attempt was made to pass a probe into the bladder, entirely without success. The lower portion of the ureter was still full of urine, which

Figure 2.

could not be forced into the bladder. All attempts to dilate the stricture failed. The bladder was then drawn over into the iliac wound, and an incision made in its left lateral aspect, thus exposing the region of the left ureteral orifice. On attempting to pass a probe from below, a tight stricture was encountered more than one centimeter above the bladder. A small bulbous dilator was with difficulty passed through the stricture until it appeared in the bladder. Palpation showed a distinct hard ring around the instrument, just above the bladder, of such strength as to prevent the passage of the bulbous part of the dilator. The caliber of the stricture was about 3 millimeters, and the thickening of the ring about 4 millimeters. The stricture was completely divided with a long-handled scalpel, for the distance of about one centimeter. Large dilators and catheters were then easily passed into the bladder through the ureter from above. The incision in the bladder and that in the ureter were closed. Recovery was uninterrupted, and examination five months after operation showed that the cut edges of the left ureteral orifice had not grown together, but presented a long slit from which the urine was seen spurting.

* "The Treatment of Calculus of the Lower End of the Ureter in the Male." *American Medicine*, 1902.

SUMMARY OF METHODS OF TREATMENT.

I recapitulate the methods of treatment:

1. Dilatation of the stricture by flexible or metal catheters in a graduated series, up to four or five millimeters in diameter. This is the ideal method.

2. Freeing the ureter from a bed of inflammatory tissue, by dissecting it out. This is occasionally sufficient.

3. Resection of the ureter. This is rarely possible.

4. Extirpation of the entire supravescical urinary tract of the affected side, by a nephro-ureterectomy or a uretero-nephrectomy, or, as I have done in one case, a nephro-uretero-cystectomy. This is the only reliable method in cases of tuberculosis, as well as of pyo-ureter and pyelonephrosis of long standing.

5. Amputation and implantation of the bladder. This is applicable when the stricture is low down, the opposite side diseased and the diseased side still capable of doing some work.

6. Complete division of the stricture. This plan may be of service when the stricture is unusually tight.

Important accessories to the treatment, and preliminaries to any active operative interference are the evacuation of the old urine or pus accumulated above the strictures, and the sterilization of the upper urinary tract by the injection of solutions of boracic acid, bichlorid of mercury, silver nitrate, or formalin.

DISCUSSION

ON PAPERS OF DRs. WERDER AND KELLY.

DR. HENRY P. NEWMAN, Chicago—I was very much interested in both of these papers as I have a case now under treatment which is giving me considerable trouble. It is where the ureters are exposed and liable to infection and where it is necessary to operate for restoration of the urethra as well as for the closure of a large fistulous tract. The patient is an undersized woman, 39 years old, married three years and tubercular with an ankylosed hip. Two years ago she was delivered of a full term, still-born child, by forcible extraction while bladder was distended with urine. She has a contracted pelvis and the delivery under such circumstances resulted not only in destruction of the bladder floor, but also of the entire urethra. Subsequently the turning out of the bladder amounted to a traumatic exstrophy, with the trigone and ureters exposed. She was operated on three times prior to coming under my observation, first at her home six weeks after delivery and subsequently in a rural hospital where the appointments were not perfect. These procedures were unsuccessful and left much cicatricial tissue, still further complicating the difficulties of the case. I could not transplant the trigone into the rectum on account of an imperfect anal sphincter. I could not close the vagina because the parties would not consent, and, further, this would necessitate a hysterectomy and would provide for no urethral orifice nor continence of urine. The operation of MacArthur, which has succeeded so well in constructing a urethra and closing the aperture in partial destruction of the floor of the bladder, was not applicable as there was not sufficient tissue in the anterior vaginal wall and the opening into the bladder was too large. In order to obviate the difficulties and dangers of repeated operating on a tuberculous patient and to give her control of urination I have devised an operation which will appear in *THE JOURNAL* together with the further history of the case.

If urinary control is not properly established by the method I shall use the instrument I here present—a Kolischer pessary—modified by Fletcher of Chicago. It consists of an ordinary Smith pessary with a cushion of hard rubber attached by a gold spring. It has been used successfully in a case where urination could not be controlled in any other way. A slight bearing-down impulse or straining on the part of the patient is sufficient to release the spring and empty the bladder.

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DR. RUFUS B. HALL, Cincinnati—These are two very interesting papers, and Dr. Werder's experience certainly is like that of every operator. If we keep at it long enough and operate on desperate cases, we will injure the ureter after a time. Dr. Kolischer loses sight of the fact that in these cases of malignant disease where the ureter is torn, where the tumor blocks up the pelvis entirely, where you must enucleate by the sense of touch and not by sight, where you injure the ureter in trying to operate for cancer of the uterus, where the ureter is embodied in the diseased tissue, or where you are trying to do the patient a kindness by operating on a late and desperate case, it is not always possible to avoid injury to a ureter. I have in mind two cases of injury of the ureter, one in which a fibroid developed in the broad ligament. It filled the pelvis full, and extended clear up to the umbilicus. She had repeated attacks of pelvic inflammation, and also suffered from a suppurative ovary. I enucleated this early in my experience, and I was glad when I was through and had my patient alive. I certainly expected her to die. She did not, however, and in the course of ten or twelve hours drainage was free, when the nurse called my attention to the fact that there was an odor of urine. In twenty-four hours it was evident that there was an injured ureter, but the patient recovered, and is living yet. She has a fistula in the line of the incision, but absolutely refuses any kind of an operation. The ureter was torn off some place, but she says she is perfectly content to die this way rather than have another operation.

The second case is a very similar one in many respects. She is a maiden lady, 56 years old, and was operated on some eighteen months ago for cancer of the body of the uterus. Five days afterwards there was a leakage of urine, and now she has one ureter opening into the vagina. She has wanted me to close it, but as I expected an early recurrence of the disease, I have been trying to convince her that an operation is not necessary. If she has no recurrence later on, I shall probably devise some means of relieving her.

DR. GUSTAV KOLISCHER, Chicago—So far as Werder's cases are concerned, I have no criticism to offer in the first three. The fourth is of more interest, and I would like to ask why he did not operate in the usual way. If there is any doubt about injury to the ureters, we have to cut down on them and do what is necessary at once. The operation for vesico-vaginal fistula is doubtless ingenious, but the principle is that of Mackenrodt, who advanced it some ten years ago, and he should receive credit for it. The success following it seems to be a permanent one, and I can not see why Dr. Werder did not use Mackenrodt's method entirely, as he says there is now a diverticulum in the bladder, which is dangerous. It allows the urine to gather, and to decompose, thus establishing a liability of secondary infection of the kidneys. That the epithelium of the vagina will not change to bladder epithelium is a foregone conclusion.

As to Dr. Kelly's paper, I think it is a most valuable contribution to our knowledge of the diseases of the urinary tract, and he is quite right when he says that many operations done for hydronephrosis and pyonephrosis are nothing more than incision of the sac and do not produce a cure, only affording temporary relief.

So far as diagnosis of ureteral stricture is concerned, that is a very difficult task. First, the presence of the stricture must be established, and, second, how far it extends. Even the most experienced men are oftentimes unable to answer these questions. We can tell where the stricture begins, but not where it ends. I agree fully with Dr. Kelly that radical treatment for strictures will be excision of the ureter, according to Kelly's method, or implanting into the bladder. I do not agree with Kelly that ureteritis is most frequently caused by tuberculosis, as we frequently find it present in gonorrheal conditions. I demonstrated some years ago that we can palpate the ureters running from the pelvis as thickened cords. If we use a cystoscope and illuminate the ureter from behind, the opening is patulous and transparent for two inches. If there is any infiltration, this part is absolutely dark. When we see a dark red cord running alongside the bladder instead

of this transparent cord, which is seen in normal cases, we know that the ureter is inflamed.

DR. WERDER, in closing—As to the technic of the operation criticised by Dr. Kolischer, I am sure that exposing the ureters at the start would have been just as difficult on account of lack of room, as the operation itself. I might have introduced catheters into the ureters had I anticipated the difficulties of the case. Under ordinary circumstances bisection of the uterus with enucleation of the tumor would have been the proper thing to do, as that would have made room to complete the operation with ease. In this case, however, this procedure would have invited sepsis, as a part of the tumor was sloughing and there was an offensive discharge from the uterus and consequently infection could hardly have been avoided. I do not see, therefore, how these complications could have been avoided.

In regard to the statement that this is Mackenrodt's operation, the Doctor evidently did not understand my own. Mackenrodt's operation was done for a single uretero-vaginal fistula, the orifice of which he attached directly to a small opening made into the bladder. In my case there was a double uretero-vaginal fistula, there was no attachment made to the bladder at all, the urinary secretion was turned into the bladder through the upper portion of the vagina, which was made a part of the bladder. There is, therefore, not even a resemblance between the two operations. Why, in Mackenrodt's operation, there should be less danger of infection I can not understand, because in both operations the infection takes place through the bladder. It would have been much more difficult, if not impossible, to properly attach the orifices of both ureters to the bladder wall according to Mackenrodt's method, without gaining any advantage over the procedure adopted by me which is very simple and answers the purpose admirably in every respect. The direct implantation of the ureter into the bladder is much more liable to be followed by stricture than is the case in my operation.

DR. KOLISCHER—I would like to ask whether these cicatricial openings, now a part of the trigone of the bladder, are less liable to shrink than Mackenrodt's transplantation. His operation was devised to prevent shrinkage.

DR. WERDER—In my operation there is no fistulous connection between the bladder and the vagina, but a large free opening into which you can place two fingers and your thumb. The mucous surfaces are united very carefully, and I can not see how this large opening could shrink sufficiently to prevent a free communication with the bladder.

DR. KELLY, in closing—I am very glad that Dr. Kolischer called attention to the question of shrinking of the stricture, as I have given that considerable thought. I spoke of the urine spurting out past the stylet as soon as the catheter was introduced. If it stops there, you know the stricture does not extend above that point. By measuring the distance from the external orifice to the opening of the speculum, and the length of the speculum, then introducing the catheter as far as it will go, then measuring the distance from the speculum to the tip of the catheter, and you have the approximate location of the stricture. Those strictures usually involve the lower part of the ureter, and do not go above the pelvic brim.

As to injuries of the ureter in abdominal surgery, I have one of my assistants writing an elaborate paper on that subject, and he told me he had thirty in some thousand abdominal sections. With increasing experience I find that I am exercising extraordinary care when working in the pelvis, especially so as not to injure the ureters, and I do not have any such accidents. Bisection helps me materially in many cases. Then, most important of all, careful inspection of the ureters before the operation is completed, and I always pick them up to make sure that they are intact, and also to train my class where they must look for them. One of my assistants injured a ureter before the close of the operation without knowing it, and a couple of days afterwards the patient had severe pain in that side. He wanted to open the abdomen, but I catheterized, got the catheter through, and all pain disappeared. If I had a portion of a ureter injured, I would simply tie it, and let it go, trusting that there would be

no trouble from that source. Some cases recover without symptoms when the ureter has been tied. Others would suffer considerably, and it would be necessary to make an opening into the bladder and draw the ureter into it. Dr. Hunter has devised a very careful method which has been followed by good results. I devised and published my method independently of Witzel.

THE MODERN DENTIST FROM A MEDICAL STANDPOINT.*

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One result of the Baconian method of research has been to enlighten both the scientific and the professional mind. Previous to the time of Bacon, scholastic arrogance prevailed, and the votaries of the then dawning sciences kept themselves aloof from a large portion of their fellow beings, whom they regarded with the greatest contempt or indifference. Scholasticism, long decaying, received its death-blow from Bacon. It, however, struggled desperately against its destruction and, so persistent has been the contest, that at the present day there remains a remnant of that haughty arrogance. But that is slowly disappearing before the radiance that is glowing from the secrets of ethical and physical laws that are now being revealed to man. This advance in knowledge has gradually developed a fraternal feeling among the various investigators in not only the closer, but also the more distantly allied branches of science. This accession in science has necessarily enlarged the views of man, and consequently has made inroads into that seclusiveness that had grown and encircled most of the professions, and particularly the medical profession.

It would be interesting, indeed, to trace historically the gradual crumbling of those seclusive walls, built as they were of arrogance and prejudice. But that is not our present purpose. We desire simply to emphasize the fact that it is due to this general advancement in science that we have to-day a medical profession that is liberal and democratic, and that is extending the hand of fellowship to every one engaged in the healing art, irrespective of the specialism that he may have chosen. Thus, when, in 1882, a few of the prominent practitioners of dentistry desired that a section, representing their branch of surgery, be created by the American Medical Association, their request was granted and a section of stomatology was added to the existing sections of that representative medical body. This professional recognition of dental surgeons entitles them to the privileges, advantages and courtesies due to any other member of the American Medical Association. This affiliation should be an incentive to members of local and state dental societies to occasionally discuss subjects that have a general bearing upon medical questions. This is the method followed by other specialisms, as, for instance, those of ophthalmology and dermatology.

I believe that a dental student, when matriculating at a dental college, should be impressed that he is about to enroll himself as an aspirant to membership of what is termed a learned profession. He would thus, at the beginning of his studies, realize that his curriculum must necessarily be a comprehensive one, embracing all of the studies pertaining to the profession of which he hopes to become a member. I believe few of those who have given anatomic lectures to dental students will

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