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Catheterism of the Ureters in the Male with the Help of the Ureter Cystoscope—A Report of Seven Cases

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Reprint from the MEDICAL RECORD, *May 1, 1897*

NEW YORK
THE PUBLISHERS' PRINTING COMPANY
132, 134, 136 WEST FOURTEENTH STREET
1897

CATHETERISM OF THE URETERS IN THE MALE WITH THE HELP OF THE URETER CYSTOSCOPE — A REPORT OF SEVEN CASES.[1]

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In my paper read before the section on general surgery of the New York Academy of Medicine, on November 11, 1895, entitled: "Catheterism of the Ureters in the Male and in the Female with the Help of Casper's Ureter Cystoscope,"[2] I purposely abstained from adding illustrative cases. The reason was that none of the diagnoses of renal disease in the male established by me with the help of separate collection of the secretion of each kidney, without a cutting operation, had, up to the time of reading and publishing the paper, been verified by operation or further manifestations in the course of the disease.

To speak at this date of the immense value, nay, of the necessity of performing cystoscopy and catheterism of the ureters in trying to clear up an obscure urinary disease, is rather a superfluous undertaking. The importance of the work is generally recognized. Since Kelly's method of viewing the bladder and draining the kidneys in the female has come into more general use; since special cystoscopic instruments, imported from the other side, are not needed to carry out this work, this method of cystoscopy has been more widely

[1] Read before the section on genito-urinary surgery of the New York Academy of Medicine, April 13, 1897.

[2] New York Medical Journal, March 21, 1896.

employed, and now seems to be resorted to by operators everywhere when treating female patients. If the same method of ballooning the bladder with air, and inspecting its interior through straight tubes introduced through the dilated urethra, could be utilized in the male, the whole matter would be very simple. But this can and will never be the case. The anatomical features of the male urethra, its limits to dilatation, the fact of its being surrounded by the prostate gland in its posterior part, will forever exclude Kelly's method from being used in the male. In very exceptional cases it may be successful. But it can never become a method that deserves recognition and recommendation. In the male it will never compete with Nitze's method. We are therefore justified in the assumption and can state the dictum: Cystoscopy and catheterism of the ureters in the male will forever be best carried out with instruments the principles of which have been laid down by Nitze.

That the problem of draining the kidneys of the male through catheters that are handled in front of the external meatus of the urethra, and introduced into the ureteral opening under the guidance of our eyes —that this problem, I say, has been actually solved is an established fact. Yet it seems there is still a doubt, yes, even a mistrust in the mind of many with reference to the feasibility of the procedure. Only a short time ago a colleague of high standing in the genito-urinary specialty wrote me, stating that he wanted to send a male patient to me in order "to test the efficiency of ureteral catheterization for diagnostic purposes."

Mr. Chairman and gentlemen, there is no longer such a thing as testing the efficiency of this procedure. Let it be generally understood that to-day the ureters of the male can be catheterized and the kidneys drained without a previous cutting operation. But the method has its limitations, as cystoscopy has

when carried out with Nitze's instrument. The method will and must be a failure whenever the three cardinal conditions which permit cystoscopy cannot be fulfilled, viz.:

1. If the calibre of the urethra is not sufficiently large to allow the passing of the instrument.

2. If the bladder has not a capacity of at least four or five ounces.

3. If the fluid within the bladder cannot be made and kept transparent.[1]

Now and then these cardinal conditions are fulfilled, and yet the method proves unsuccessful owing to the fact that the mouths of the ureters cannot be found, or that they cannot be approached, or that they are too small to allow the entrance of even the finest of catheters.[2] Sometimes the catheter has well entered the ureter, but it soon becomes plugged by descending blood or pus.

To prove by illustrative cases that catheterism of the ureters is a feasible procedure in the male, and can be carried out even in patients with hypertrophy of the prostate, and that therewith our capabilities of distinctly diagnosing an obscure renal disease in the male are at last also very greatly enhanced, is the object of this paper.

Case I.—F. M——, twenty-eight years of age, married, experienced a sudden, sharp pain, a little above and to the left of the symphysis, about eight months ago. At the same time micturition became very frequent (sometimes every ten minutes), but was not painful; the urine never contained blood. In spite of proper medical treatment the pain remained persistent, so that the patient had to quit work. After a few weeks he was again able to attend to business in com-

[1] See for particulars the author "On Cystoscopy," in "A System of Genito-Urinary Diseases, Syphilology, and Dermatology," edited by Prince A. Morrow, vol. i., pp. 455 and 456.

[2] I lately had such a case in the female; see later on.

parative comfort. He had almost considered himself cured when, five weeks ago, the former pain returned in the same place as before, and with equal severity. Soon after it also appeared on the opposite side. One month before there had been another obstinate attack of frequent micturition. History with reference to tuberculosis negative. Specific infection eleven years ago; as far as known no secondary symptoms. Urine macroscopically clear; left epididymis slightly painful to the touch and infiltrated; prostate normal.

Examination of bladder urine:[1] Acid; specific gravity, 1.026. Amount of urea, 0.023 in 1 c.c. Chlorides (approximate), 0.01 in 1 c.c. Faintest trace of albumin.

Microscopic examination:[2] A few cells of blood and pus; fair amount of mucus; few hyaline casts; many cells of the superficial layer of the bladder; few cells of the renal pelvis; marked deposit of phosphate-of-calcium crystals.

Diagnosis, based on the result of the urinary analysis: Slight renal hyperæmia, with slight irritation of the pelvis. Fairly marked vesical irritation with congestion; suspicion of stone.

Question: Does the amount of crystalline deposit descend from one kidney only, or from both? With other words: Is the clinical probable diagnosis of gravel or stone in the left kidney corroborated by actual facts?

October 25, 1895, cystoscopy and catheterism of the ureters with Casper's ureter cystoscope at my office. (This is the first case in which I ever used the instrument.) Cocaine anæsthesia. Bladder normal; a few disseminated spots injected, especially so the trigonum. Mouth of left ureter is first approached;

[1] All examinations of urine in the cases here reported have been made at the laboratory of Dr. Fred. E. Sondern, of New York City.

[2] The sediment of the specimens was in each case obtained by centrifuging the urine for eight minutes at twenty-five hundred revolutions.

catheter enters at first attempt without difficulty and without pain. It is pushed forward for about one and one-half inches. Then the tiny mandrel is withdrawn. After a few seconds urine begins to flow, drop by drop, first at intervals, then almost continuously; it is slightly turbid. To comfort the patient, the catheter is lifted out of the groove of the instrument with the help of the straight metal mandrel and the cystoscope is withdrawn from the bladder.[1] The kidney drained rather fast; 10 c.c. were collected in a small tube, marked "Left," in twelve minutes (I had ordered the patient to take two cups of coffee for his breakfast, and a few tumblers of water before coming to my office). After this amount had been gathered the catheter was pulled out of the left ureter, the cystoscope introduced for a second time into the bladder, and the manœuvre repeated at the mouth of the right ureter with the same ease and rapidity. The discharge from the right kidney was still more copious. Almost without cessation 11 c.c. flowed off in eight minutes. During this time the cystoscope was left *in situ;* then it was removed with the catheter. Both specimens thus obtained were submitted to Dr. Sondern for analysis. I cite from his report specially interesting points·

Reaction, L. and R., acid.[2] Specific gravity, L., 1.011; R., 1.013 (at 15° C.). Amount of urea in 1 c.c., L., 0.015; R., 0.017. Chlorides (approximate), L., 0.005; R., 0.0075 in 1 c.c. Albumin, L., present; amount according to Esbach's test (approximate), 0.25 per cent. by weight; R., negative.

Microscopic examination: Blood, L., fair amount; R., few cells only.[3] Pus, L., few cells; R., none.

[1] For particulars see author, *l.c.*, Medical Journal.

[2] L., left; R., right.

[3] The few cells of blood, or the small or fair amount of the same in nearly all the specimens of renal urine collected through the ureter catheter, are due to the slight mechanical lesion of the tender ureteral mucous membrane by the instrument. For this reason I lately have not saved the first ten or twelve drops which es-

Casts, L., few hyaline and epithelial-studded casts; R., none. Bacteria, no tubercle bacilli, no gonococci, on either side. Epithelium, L., many cells of ureter and renal pelvis; R., few cells of ureter and renal pelvis. Crystalline and amorphous deposit, L., considerable uric-acid crystals; R., some uric-acid crystals.

Diagnosis, based upon this examination: R. kidney, parenchyma normal; moderate excess of uric-acid crystals, with possible slight irritation of the renal pelvis. L. kidney, hyperæmia of the parenchyma with catarrh of the renal pelvis, both probably due to the presence of a stone. Bladder, marked vesical irritation and congestion.

As the patient could not leave his work at that time and did not suffer materially, an operation on the left kidney was deemed inadvisable, but proper medical treatment was begun. The man did well for the following three weeks, when he went back to his former home in Germany. I have not heard from him since.

Case II.—M. L. Y——, thirty-four years old, seen by me in consultation with Dr. A. H. Fridenberg, of this city, December 6, 1895. Patient had scarlet fever in his early youth with following kidney trouble, which lasted several years but was ultimately cured. In 1884, gonorrhœa; discharge for several months; no complications. In 1888, urine contained pus and a corresponding amount of albumin; no casts; amount, two quarts per diem; specific gravity, 1.016. In the fall of the same year the patient was suddenly taken sick with a chill and fever, and general malaise. During this time the urine appeared much clearer. With decreasing temperature the turbidity returned. Afterward pus was permanently present, about one-tenth volume. In April, 1890, the patient, then being in the South, again had a severe attack; three consecutive

cape through the catheter. They often appeared brown, or even red. We may assume that blood which appears later on, especially in a larger quantity, descends from the kidney.

chills with following high temperature; he had to stay in bed for a week; quinine did not relieve his condition. Once he had also moderate transient pain in the left lumbar region. Patient lost in weight. November, 1891, third attack with a temperature of 106° F.; one year later a fourth and last one, much milder in character. After that the patient was much better, but the urine remained turbid. He has seen many physicians in this city and in the South; so far a definite diagnosis could not be made.

Status præsens: Micturates three or four times a day, nights not at all; slight tenesmus. Prostate somewhat enlarged, soft; on massage per rectum, no discharge from urethra. Kidneys not palpable; no pain on pressure in either lumbar region. Urine turbid, acid, odor slightly offensive; amount, 1,520 c.c. in twenty-four hours.

Urinary analysis, December 7, 1895: Specific gravity, 1.017; amount of urea, 30.6 in twenty-four hours; chlorides (approximate), 15.3; trace of albumin.

Microscopic examination: Moderate amount of pus, forming the bulk of the deposit; also a few tubular plugs of the same; some hyaline casts; no tubercle bacilli; no gonococci; numerous cells of the superficial and middle layers of the bladder; few cells from the renal pelvis; rather large amount of oxalate of lime and uric acid.

Diagnosis based on urinary examination: Catarrh of the renal pelvis, probably a very moderate pyelitis and the cause of a very moderate renal hyperæmia; moderate chronic cystitis; excessive crystalline deposit, allowing suspicion of renal stone.

December 11, 1897: Cystoscopy and catheterism of the ureters with Casper's instrument, under cocaine, in the presence of Dr. Fridenberg; bladder contains six ounces of sterilized two-per-cent. boric-acid solution. It shows the symptoms of some chronic cystitis. The manœuvre of engaging the catheter in the ureteral

mouth is again easy and successful at first attempt; the catheter is introduced about one and one-half inches. Kidneys work rapidly; patient had taken more fluid than usual before coming to my office, according to my orders.

Amount of urine passed: L., 6 c.c. in 19 minutes; R., 10 c.c. in 8 minutes. Color, L., pale; R., light yellow. Odor, L., offensive; R., characteristic. Reaction, L. and R., acid. Specific gravity, L., 1.008 at 15° C.; R., 1.015 at 15° C. Amount of urea: L., 0.009 in 1 c.c.; R., 0.016 in 1 c.c. Chlorides (approximate), L., 0.005 in 1 c.c.; R., 0.01 in 1 c.c. Albumin, L., good trace; R., trace.

Microscopic examination: Blood, L. and R., small amount; pus, L., very small amount; R., none. Mucus, L., small amount; R., none. Casts, L., some hyaline and epithelial-studded casts; R., none. Bacteria, L., no tubercle bacilli, no gonococci; many pyogenic cocci; R., none. Epithelium, L., some cells from ureter, numerous from renal pelvis; R., some cells from ureter only. Crystalline and amorphous deposits, L., some uric acid and oxalate of lime; R., none.

Extract from remarks made by Dr. Sondern: "Left kidney: The lower specific gravity and diminished amount of urea and chlorides excreted, with a little more albumin than the blood present would account for; the presence of hyaline and epithelial-studded casts, a little pus and mucus, and epithelial cells from the renal pelvis, with an offensive odor, would indicate a very slight pyelitis with fermentation in the pelvis, and some nephritis, chronic in character. The affection of the parenchyma seems out of proportion to the slight inflammatory lesion of the pelvis.

"Right kidney: The relatively normal excretion of urea and chlorides, no more albumin than the blood present would account for, and the absence of renal elements on microscopic examination, would exclude any renal lesion. The presence of the small amount

of blood and epithelial cells of the ureter is due to the introduction of the catheter."

Diagnosis, based on the urinary examination: Left kidney, some chronic nephritis with very slight pyelitis. Etiology, probably stone. Right kidney, normal.

The result of this examination speaks for itself. After seven years of existence, an obscure urinary trouble, with an almost entire absence of clinical symptoms for the last three years, is clearly diagnosed beyond doubt and dispute.

So far the patient has not submitted to an operation, as his subjective condition is rather good. I shall not fail to report at a future time whether this strictly laboratory diagnosis has been corroborated by direct inspection.

Case III.—B. B——, fifty years old, seen by me in consultation with Dr. Fred. E. Sondern. Previous history negative. In October, 1894, he had a very acute attack of pain in the region of the right kidney, radiating into the right testicle and the penis; tenesmus and frequent desire to urinate; nausea and vomiting. Duration three hours.

Analysis of urine (first passed after attack): Acid; 1.025; some albumin, but not more than the blood present accounts for.

Microscopic examination: Small amount of blood, some groups of epithelial cells, from the renal pelvis presumably; large quantity of uric acid in crystals. Also amorphous urates, some bladder cells. No stone was passed.

During the following two months the patient had several attacks of right renal colic; pain was usually greatest at a point midway between the umbilicus and the anterior superior spine, radiating from there into the penis and scrotum. Duration varied from one-half an hour to four hours. In the early part of 1895 there were frequent, at times daily attacks of pain more or less severe, radiating downward from the point above stated.

March 15th, a very severe colic, lasting three hours. Urine: 1.015, albumin, considerable blood, some hyaline casts, no crystalline deposit. From the end of April to October no symptoms referred to the genito-urinary tract. Then again there was constant pain in the region previously mentioned. Urine, 1.020; chemically and microscopically negative. For the following month the patient was under the care of a neurologist, at the suggestion of a surgeon whom the patient had consulted. Both gentlemen looking upon the condition as a neurosis, the previously ordered and strictly followed medication and diet were discarded.

December 14, 1895: Severe renal colic on right side; duration four hours. Urine, 1.029; albumin and considerable blood, some hyaline casts, epithelial cells of the renal pelvis and bladder, large quantity of uric-acid crystals and amorphous urates. Subsequently much pain and burning referred to the glans penis for some days. Several days after the last attack a small particle which consisted of mucus was found in the urine, in which there were also some blood and pus, numerous epithelial shreds, presumably from the renal pelvis, numerous hyaline casts, and crystals of uric acid.

First few days of 1896, colics almost daily. January 4, 1896, patient came with Dr. Sondern to my office for ureter catheterism. Cocaine anæsthesia; six ounces of a sterile two-per-cent. boric-acid solution were injected into the bladder. Cystoscopy showed marked uniform hypertrophy of the prostate; mouths of ureters easily approached. The right side, being the one presumably diseased, was catheterized first. Eight cubic centimetres were collected within twenty minutes, during which time the cystoscope had been left *in situ*. Then the ureter catheter, which had been pushed up for about two inches, was removed from the right side, and a new one introduced through the channel of the instrument, which had been left

in place, into the bladder. After having entered the left ureter, I wanted to save the patient the little annoyance of the further presence of the cystocope, and, contrary to my rule, which is to leave the tip of the catheter within the lower three inches of the ureter, I pushed the catheter quickly up toward the kidney for about twenty centimetres, in order to be sure that it would not slip out of the ureter back into the bladder when pulling out the cystoscope. I then liberated the catheter and removed the cystoscope. Now I pulled out the mandrel. No urine escaped. I pulled and pushed the catheter, and aspirated with a powerful syringe; no urine. I pulled the eye of the catheter down into the lower third of the ureter, aspirated, and waited; no urine. I then injected a few drops of a sterilized saline solution in order to clean the tiny lumen of the catheter, thinking it might have become clogged; as I had expected, a vehement renal colic was the result; but not one drop of urine appeared. I had to remove the catheter entirely, and then learned to my disgust that the tip of the latter had bent a little at the eye, and that within it a small shred of coagulated blood had been caught. In spite of a perfectly successful catheterism of both ureters, the whole procedure was thus, in part at least, a failure. I had the urine of the right kidney only (the probably diseased one), and none from the left for comparison. The patient's condition did not admit of my again introducing the cystoscope to catheterize the left ureter for the second time. I regret to-day that I did not at once withdraw the tip of the catheter from the ureter back into the bladder, wash it through with the syringe attached to the outer funnel-shaped end, and then reintroduce it into the ureter. With my present experience I should certainly have done so. Of course, for this purpose I should not have removed the cystoscope from the urethra and bladder. It is certainly of great importance not to withdraw this in-

strument until the urine has begun to drain through the catheter. With the cystoscope still within the bladder, one generally has no difficulty in pulling the catheter back into the vesical viscus, cleaning it there, and then reintroducing it into the ureteral mouth.[1]

Analysis of urine from right kidney: Acid; 1.020; albumin, trace; amount of urea, 0.02 in 1 c.c.

Microscopic examination: Some blood, probably due to the introduction of the catheter; few pus cells, an excess of mucus, numerous groups of epithelial cells from the renal pelvis; exceedingly large amount of uric acid in small crystals and also large aggregations, apparently broken.

After the catheterism of the ureters the patient claimed to be much better. Besides being put on large quantities of water and a general régime, he was given urotropine, fifteen grains three times a day. In a subsequent consultation held with two colleagues, it was, therefore, decided to keep the patient under observation and medical treatment. So far, he has been free from further attacks of renal colic.

CASE IV.—J. S——, twenty-eight years, of Rochester, came under my care through the courtesy of Dr. S. L. Elsner, of that city, January 31, 1896.

Four years ago patient noticed blood in the urine and experienced great pain in his left lumbar region; had to stay in bed for three days. Hæmaturia ceased after a few weeks; pain, however, has persisted ever since; is much worse since the last six weeks. Urinates at times three and four times a day; now and then very frequently, every hour or even half-hour. He then has pain in the glans and at the neck of the bladder. Bladder large, holds easily three pints of

[1] On January 4, 1897, when catheterizing the ureters of a lady who evidently had a pyonephrosis, I pulled the catheter out of the ureter three times and then washed it through, its tip being within the bladder. When I had catheterized the ureter for the fourth time urine at last began to flow. I could collect fifteen cubic centimetres in ten minutes. Examination was in every way successful.

fluid. History of tuberculosis and gonorrhœa negative. Chancre twelve years ago, but no secondary or tertiary symptoms.

Objective examination negative. Urinary analysis, February 3d: Acid; specific gravity, 1.024; marked deposit; amount of urea, 0.026 in 1 c.c.; chlorides (approximate), 0.01 in 1 c.c.; trace of albumin.

Microscopic examination: Moderate amount of blood; very moderate amount of pus, few tubular plugs of the same; moderate amount of mucus; few hyaline casts; no tubercle bacilli, no gonococci; numerous cells of the superficial layer of the bladder; some of the renal pelvis; exceedingly large amount of uric acid and oxalate of calcium, forming the greater bulk of a considerable deposit.

Extract from remarks made by Dr. Sondern, accompanying the report: "The exceedingly heavy deposit of oxalate of calcium and uric acid are most worthy of note, allowing the strong suspicion of renal stone. I believe the amount of gravel found in the bottom of each of the two bottles sent, if continually excreted, would alone be sufficient to cause the lesions above stated, and would account for the blood present."

Diagnosis based on urinary analysis: Very moderate pyelitis with but slight secondary affection of the renal parenchyma; strong suspicion of renal stone; moderate secondary chronic cystitis.

February 7th, cystoscopy: Symptoms of moderate chronic cystitis; no calculus; no ulcer; mouths of ureters injected, projecting considerably into the bladder on either side.

February 12th, catheterism of ureters (Casper's instrument), 650 c.c. of fluid in bladder. Manipulation not so easy as in the previous cases, in which 150 to 200 c.c. of boric-acid solution had been injected. Discharge through ureter catheter as noted during the examination:[1] L. kidney drains 12–13 drops every

[1] Patient had taken much fluid before coming for the examination.

20–34 seconds—in all, 10 c.c. in 9 minutes; R., 16–32 drops every 3–5 seconds—in all 12 c.c. in 5 minutes.

Analysis: Odor, R., characteristic, not offensive; L., possibly slightly offensive. Reaction, R. and L., acid. Specific gravity, R. and L., 1.004 at 19° C. Amount of urea, R., 0.009 in 1 c.c.; L., 0.008 in 1 c.c. Chlorides (approximate), R. and L., 0.0025 in 1 c.c. Albumin, R., negative; L., trace.

Microscopic examination: Blood, R., few cells only; L., small amount. Pus, R., none; L., very small amount. Mucus, R., none; L., small amount. Casts, R., none; L., few hyaline casts only. Bacteria, R. and L., no tubercle bacilli. Epithelium, R., some cells of ureter only; L., some cells of the ureter and some of the renal pelvis. Crystalline and amorphous deposit, R., very few uric-acid crystals; L., considerable uric-acid crystals.

Extract from remarks made by Dr. Sondern: "Right kidney: As the specimen shows no albumin, an absence of renal elements microscopically, and the very few blood cells or epithelial cells of the ureter being accounted for by the introduction of the catheter, a renal lesion on that side can be excluded.

"Left kidney: There is a slight diminution in the relative excretion of urea, more so when one considers the diminution in the amount of urine voided in a given time; a trace of albumin and few hyaline casts, the whole indicating a moderate chronic nephritis; together with few pus cells, few epithelial cells of the renal pelvis, some mucus, a possibly faintly offensive odor, but no tubular plugs of pus, which would indicate a catarrh of the renal pelvis. There is beyond doubt a much larger quantity of uric acid voided by the left kidney than by the right; the whole amount does not, however, nearly approach that found in the specimen of February 3, 1896. This may be accounted for by the dilution of the urine by ingestion of water prior to examination, as the specific

gravity of the above is 1.004, compared with 1.024 of the previous examination. There must, however, remain the suspicion of uric-acid stone in the left kidney. It is also possible that such a condition as above described might be caused by a long-continued passage of large amounts of uric-acid gravel."

Provided all urine was collected from each kidney in the time specified, the proportion of work done would be as follows: Right kidney, seventy per cent.; left kidney, thirty per cent.

Diagnosis, based on urinary analysis: Right kidney normal; left kidney, very moderate chronic nephritis with catarrh of the renal pelvis; suspicion of renal stone, or possibly only gravel.

In view of this result, I advised the patient not to undergo an operation right away, but, in spite of having been under medical care for a number of years, to once more try a strict régime for lithæmia. This was faithfully done at the patient's home, under Dr. Elsner's supervision. Six weeks later the patient came back to New York, ready to submit to whatever operation might be found necessary. Internal medication and dieting had not relieved his suffering. On the first of June, at the German Hospital, I cut down on the patient's left kidney by the longitudinal incision; the pelvis and upper portion of the ureter were easily exposed. There was no palpable concretion. Then the kidney was bluntly freed from its surroundings (a manœuvre which proved somewhat tedious on account of manifold adhesions, especially to the lower surface of the diaphragm) and pulled in front of the twelfth rib. The organ was large and hyperæmic, more curved around the hilus than is usually seen, as if enclosed by too tight a capsula propria. Careful palpation of the pelvis and parenchyma, also multiple needling, did not prove the presence of a concretion.

Having in mind the negative operative result of Case VI. (May 15th), I did not make the section-cut

of the kidney, but opened the rather small pelvis and probed upward into all the renal calyces, and down toward the bladder. There was no stone. The wound of the pelvis was at once closed by a few catgut sutures which avoided the mucosa. Suspecting that the rather tight capsule might possibly play a rôle as an etiological factor in the clinical symptoms, I split it at its convexity, stripped it off the kidney anteriorly and posteriorly, and resected it down to the pelvis. Then the kidney was replaced, the subdiaphragmatic space drained by a gauze strip (for forty-eight hours), and the rest of the wound closed by sutures. The patient made a good recovery. During the first few days his urine was bloody, but it soon cleared up. An irregular temperature which suddenly appeared on the twelfth day after operation was broken by quinine. A report received from Dr. Elsner in reply to my inquiry of April 10th states: "The patient has gained ten pounds; he looks well, but claims to have considerable pain in the left side of the epigastrium, and in the back in the region of the fixed kidney. This pain is more marked upon change of posture, and on deep inspiration. He admits being better for the operation. His urine still contains a little pus and débris, and becomes alkaline almost immediately after voiding."

The case strikingly demonstrates, as does also Case VI., that crystalline deposits found in the urine may be unequally produced in the kidneys. That renal concretions and gravel are often found unilaterally cannot be explained in the same way. We know that the nucleus of a calculus of the kidney, even one of smallest size, has an organic structure as its basis. With it the uric-acid salts are very strongly united. Around this centre the salts dissolved in the urine rapidly deposit, making the stone. It is different with the uric-acid crystals, which are contained free within the urine.

Of course, the conclusion drawn from this irregular discharge of crystalline deposit in the renal urine found by catheterism of the ureters is open to the objection that the suspected renal stone, although not found during the operation, may nevertheless have been present somewhere in the organ.

Case V.—M. P——, forty-four years old, sent to me through the kindness of the late Dr. Charles Milne, of New York, on November 15, 1895. Had gonorrhoea twice at the age of nineteen and twenty-three respectively. Ten years ago he sustained an injury to the perineum followed by swelling and abscess formation in the right testicle. During the last year there has been slowly increasing frequency of micturition, polyuria. March, 1895, painless hæmaturia, twice on same day in succession; blood thoroughly mixed with urine; no tenesmus. After that urine clear. The following night, sudden call for micturition; passing impossible; then a discharge of a larger amount of pure blood, once only. Two weeks later another single marked attack of hæmaturia beginning with right lumbar pain. In May a small quantity of blood passed for the third time; between that time and November, two more slight attacks.

Status præsens: Micturates four or five times a day; at night once or twice, without tenesmus. Now and then there is pain in the glans. Occasionally he finds small pieces of coagulated blood in the chamber; the last drops are never colored. Of late he has frequently had colicky pain in the region of the right kidney, radiating down to the right testicle; he has lost twenty pounds during the last six months. One brother died in Florida of phthisis (?); otherwise history negative. No specific infection. Palpation of kidneys negative; prostate slightly enlarged, painful to the touch.

Urinary analysis: Amount of urine passed in twenty-four hours, 1,920 c.c.; reaction acid; specific gravity,

1.015; marked deposit. Amount of urea in twenty-four hours, 26.88. Chlorides (approximate), 9.6 in twenty-four hours. Albumin present, 0.1 per cent. by weight.

Microscopic examination: No blood; considerable pus; also tubular plugs; considerable mucus; few hyaline and epithelial-studded casts; no tubercle bacilli, no gonococci; many cells of the superficial and middle layers of the bladder and of the renal pelvis; some indican.

Abstract of remarks made by Dr. Sondern: "The presence of the albumin, hyaline and epithelial-studded casts, with a practically normal excretion of urea, pus and tubular plugs of the same, and many epithelial cells of the renal pelvis, would indicate a pyelonephritis, the affection of the parenchyma being but moderately marked. The normal excretion of urea is surprising, and would most probably indicate that only one kidney is affected. The large number of bladder cells of the superficial and middle layers, much mucus, pus, etc., would indicate a rather severe chronic cystitis with probably small ulcerating areas. As to the etiology, repeated search failed to show any tubercle bacilli or gonococci, and there are no evidences of stone. The specimen gives no clew as to which lesion, that of the kidney or that of the bladder, is the original and which the secondary."

Diagnosis, based on urinary examination: Chronic pyelo-nephritis (the affection of the parenchyma being but moderately marked); normal excretion of urea, indicating probably that but one kidney is affected. Rather severe chronic cystitis with probably small ulcerating areas. Etiology obscure.

November 21, cystoscopy: Prostate enlarged, easily bleeding; chronic cystitis; left ureteral mouth normal, presents a narrow slit, expels apparently transparent urine; above and inward of the same, toward the fundus, is an irregularly shaped small ulceration.

Right ureteral opening wide, gaping, highly injected; its immediate surroundings markedly hyperæmic; jets of urine here purulent.

On the ground of this cystoscopic result I asked Dr. Sondern to search once more for tubercle bacilli. I had found in my experience with the cystoscope that one mouth of ureter healthy, the other and its immediate neighborhood inflamed or ulcerated, generally means: "Descending (unilateral) renal tuberculosis." The search for tubercle bacilli was taken up carefully, but with negative result. The report of November 27th reads: "In a sediment obtained by centrifuge and composed of elements as previously reported, I could not find any tubercle bacilli after repeated search over specimens prepared and stained by different methods." That of December 5th states: "In many specimens, composed of elements the same as previously reported and stained by various methods, I am still unable to find any tubercle bacilli."

The patient, dissatisfied at not getting a definite answer at once, then left my observation, and I lost track of him for a time, he having declined catheterism of the ureters. On February 21, 1896, he returned to my office, ready to submit to any further examination necessary definitely to diagnose the lesion. He had had a great deal of renal pain of late and was very despondent. The question to be decided was: Provided the trouble is tuberculosis of the right kidney, is its fellow also involved, and, if so, how far?

February 21, 1896, catheterism of the ureters (Casper's instrument) under cocaine; four and one-half ounces in bladder; manipulation easy. Amount of urine passed, L., 12 c.c. in 5 minutes, 150 drops without interruption; R., 10 c.c., in 9 minutes, 36–41 drops in one stretch; interval, 3 minutes.

Analysis: Reaction, L., faintly acid; R., alkaline. Specific gravity, L., 1.007 at 16° C.; R., 1.003 at 16° C. Deposit, L., slight; R., more marked. Amount

of urea, L., 0.01 in 1 c.c.; R., 0.005 in 1 c.c. Chlorides (approximate), L., 0.005 in 1 c.c.; R., 0.0025 in 1 c.c. Albumin: L., faint trace, fully accounted for by the small amount of blood present; R., present, 0.5 per cent. by weight.

Microscopic examination: Blood, L., small amount; R., very small amount. Pus, L., none; R., considerable, forming bulk of deposit; also tubular plugs of same. Mucus, L., none; R., small amount. Casts, L., none; R., some hyaline and few granular casts; also pus casts as above. Bacteria, L., no tubercle bacilli; R., few single bacilli, presumably tubercle, no gonococci. Epithelium, L., some groups of cells from the ureter only; R., some cells from the ureter; numerous groups from the renal pelvis. Crystalline and amorphous deposit, L. and R., very few crystals of uric acid.

Abstract of remarks: "Left kidney: The specimen derived from the left kidney by the ureter catheter shows absolutely nothing abnormal, either chemically or microscopically. The presence of a little blood and the epithelial cells of the ureter being accounted for by the introduction of the instrument; the little albumin is fully accounted for by the blood.

"Right kidney: The excretion of less urea and chlorides than from the left kidney, the presence of albumin and hyaline and few granular casts, together with considerable pus, tubular plugs of the same, and epithelial cells of the renal pelvis, would indicate a rather marked chronic pyelo-nephritis. The small amount of blood, a little less than on the other side, and the epithelial cells of the ureter are probably due to the introduction of the instrument.

"As to the etiology: A few single bacilli were found, generally only one or two on each specimen made, which I take to be tubercle bacilli. I am always very sceptical in pronouncing a result on any single organism, but the fact that there were several, considering all

the slides gone over, I do not hesitate to state that the process is presumably tuberculous. Much time was spent without avail in the endeavor to find the characteristic groups. The proportion of work done by each kidney, as estimated by the excretion of urea in a given time, provided all urine from each kidney was collected during the time stated, is as follows: Right kidney, twenty per cent.; left kidney, eighty per cent."

Diagnosis: Left kidney normal, no tubercle bacilli; right kidney, a fairly marked chronic pyelo-nephritis, presumably tuberculous.

In view of these facts, the condition was explained to the patient and his family, and an operation on the right kidney, nephrectomy if necessary, advised, and that as soon as possible. As far as I know, the operation has not yet been performed.

Case VI.—George McL——, M.D., forty-four years old, first seen by me on February 27, 1896. In 1887, when riding horseback, the patient sustained an injury to the left testicle, which was followed by traumatic epididymitis. In 1893, when in London, he had left renal colic, lasting four days and a half; hæmaturia; left testicle again became inflamed; extirpation. In the fall of 1894, after an extensive trip on a train, again pain; two days later, passage of a uric-acid stone, about one-half inch long and one-sixth inch thick; he felt much better afterward. Six months ago, moderate pain in region of left ureter; no more marked attack since then; almost constant, heavy, dull ache in left lumbar region. For the last two years the patient is also conscious of a slight pain over the right kidney. At present, the patient does laboratory work in New York; he has found in his urine casts and a large quantity of uric acid with some pus; he has always taken a great deal of albuminoids, about two-thirds of his nourishment consisting of meat.

Status præsens: Stout, short man; nothing palpable in region of kidneys; prostate normal; patient

worries a great deal over his trouble, which has lately prevented him from attending to his practice. With a view of determining which kidney most probably contained the suspected stone, I advised catheterism of the ureters. At that time the patient had to go home; he returned early in May, very despondent on account of the continuous, unabated trouble.

Urinary analysis, May 4th, revealed the following status: Amount of urine passed in twenty-four hours, 1260 c.c. Reaction, acid. Specific gravity, 1.025 at 15° C. Amount of urea in twenty-four hours, 35.28 grams; chlorides (approximate), 12.6 grams. Phosphates (approximate), some excess. Albumin, trace.

Microscopic examination: No blood. Very moderate amount of pus, also few tubular plugs of the same; small amount of mucus; some hyaline casts; no tubercle bacilli, no gonococci; some groups of cells from the renal pelvis, also numerous cells of the superficial layer of the bladder; very little uric acid.

Diagnosis based on this examination: Slight pyelitis with a moderate secondary renal hyperæmia; moderate secondary cystitis. Etiology, possibly renal stone.

Catheterism of ureters with Casper's instrument, May 6, 1896, under cocaine; procedure easy.

Amount of urine passed by right kidney 19 c.c. in 10 minutes; by left kidney, 15 c.c. in 10 minutes. (Patient had taken a great deal of fluid before examination as per my orders.) Reaction, R. and L., acid. Specific gravity, R., 1.003; L., 1.004, at 15° C., Westphal's balance. Amount of urea, R., 0.006 in 1 c.c.; L., 0.007 in 1 c.c. Chlorides (approximate), 0.0025 in 1 c.c. from either side. Albumin, R., trace; L., negative.

Microscopic examination: Blood, R., small amount; L., none. Pus, R., moderate amount, and few tubular plugs of same; L., none. Mucus, R., small amount; L., none. Casts, R., few hyaline casts only; L., none. Bacteria, no tubercle bacilli, no gonococci on either

side. Epithelium, R., numerous cells from the ureter; also some groups from the renal pelvis; L., some cells from the ureter only. Crystalline and amorphous deposit, R., small amount of uric acid; L., none.

Extract from remarks: "Specimen obtained from the left kidney: The absence of albumin and all renal elements, no pus, etc., would allow the conclusion that this kidney and its pelvis are normal. There is no blood in this specimen, and the epithelial cells of the ureter are the result of the introduction of the catheter. It may be of interest,to note that there is no crystalline deposit from this kidney.

"Specimen obtained from the right kidney: The small amount of albumin, some pus, and a few tubular plugs of the same, little mucus, few hyaline casts, and some groups of epithelial cells from the renal pelvis, together with a polyuria, and at the same time normal relative excretion of urea and chlorides, would indicate a moderate pyelitis, with but slight secondary hyperæmia of the parenchyma.

"As to the etiology, the fact that there is some uric acid in the deposit obtained from the right kidney and no crystalline deposit from the left kidney would allow a strong suspicion that the lesions above mentioned are the result of uric-acid stone or gravel."

Diagnosis, based on analysis of separately collected urine: Left kidney, normal; right kidney, moderate pyelitis, with but slight secondary hpyeræmia of the parenchyma. Etiology, justified suspicion of uric-acid stone or gravel.

With such a vague diagnosis in hand, I was naturally opposed to an operation. But the patient wanted relief at all hazards; he was very much depressed, even thought and spoke of committing suicide. He pressed for operation and asked me to perform the same. I yielded, because I thought an operation might, perhaps, reveal the presence of a calculus, if not in the pelvis then in the parenchyma; and under

aseptic precautions the interference is, furthermore, void of danger.

Before proceeding I had to promise the doctor to exhaust all the means at my disposal to find the suspected concretion in his kidney. For the same purpose he, personally, had made arrangements with Dr. William James Morton, professor of Electro-therapeutics at the Post-Graduate School, to take an *x*-ray picture of his kidney when exposed, and I had to bind myself to make the section cut of the kidney, if the *x*-rays, palpation, and needling should fail to reveal the presence of a stone. On May 15th, I exposed the right kidney by Simon's incision at the Post-Graduate Hospital. A palpable concretion could not be detected. To bring the kidney in front of the twelfth rib, a transverse incision, parallel to this rib, had to be added. There were some quite firm adhesions between the kidney and its fat capsule; they were bluntly divided. The organ when before us for inspection and palpation appeared normal throughout; there was no palpable resistance anywhere within its pelvis nor in the parenchyma, that pointed to the presence of a calculus.

According to his promise, Dr. Morton now proceeded to take the radiograph. For this purpose the kidney was surrounded by a compress of sterile gauze and the sensitive plate wrapped in two sterile towels. Then the assistant took the plate and pushed its border into the transverse wound, while I, gently fixating the kidney with the second and third fingers of both hands a little below its pelvis, tried to steady the organ as much as possible. By taking special care to keep the patient well narcotized, an exposure of nine minutes to the rays sufficed, and Dr. Morton, within ten further minutes, developed a very good negative of the kidney. It presented very beautifully the entire kidney except its pelvis (which had been shadowed

by one border of the wound) in the shape of a uniformly white area. Comparing this negative with others, which Dr. Morton had taken with the *x*-rays from cadaver-kidneys containing larger and smaller calculi, it seemed evident that a stone of even moderate size was not present in the parenchyma. But our experience with the *x*-rays in this respect is of rather recent date and limited. Furthermore, I had faithfully promised to proceed in my search. After an intermission of twenty minutes, I therefore continued the operation, rather unwillingly. Following my directions, the house surgeon, Dr. Chas. L. Ogden, now took hold of the organ's pedicle. He compressed the renal artery and vein between the pulpæ of the second and third fingers of both hands, while I with two rapid incisions divided the organ from its convexity down into the pelvis, thus splitting it into two equal halves (section cut). The doctor did his part of the work so thoroughly and cleverly that the operation was almost bloodless, and we had a full view of the pelvis and pyramids, and could probe the calyces in all directions. There was no stone. The doctor continued his compression a few moments longer, until four deep catgut sutures and five more superficial ones, all traversing the parenchyma, had brought into apposition the two halves of the kidney. Now the assistant's fingers were removed from the renal vessels. The slight hemorrhage from the stitch channels and from the wound at the convexity was easily controlled by a short compression. The kidney was replaced, the wound partially drained by gauze, partially closed by sutures.[1]

The doctor's recovery was uninterrupted. Of course, at first the feeling that the stone had not been found created some worry and more mental depression. However, the absence of pain during his stay at the hospital, and the rapidly closing wound cheered him

[1] In October, 1895, I had also done the section cut of the kidney in a man of twenty-nine years. The patient recovered.

up and made him forget that he had in vain gone through all the phases of this complicated operation. On July 6th he left the city, with the wound almost closed. He emptied his bladder every two or three hours; the urine showed slight turbidity. The latter was due to some muco-pus, which evidently still came down from the right kidney. As the doctor advised me by letter, under date of November 3, 1896, this discharge was still present, intermittently; the former pain had very much improved. There was evidently an exacerbation of that moderate right pyelitis which I had found by ureter catheterism before the operation. During the winter months the patient was in southern California. About his present condition I cannot state anything, as I have not yet received an answer to my letter of inquiry, sent a few weeks ago. Excluding, for a moment, the possibility that a stone within the parenchyma of the right kidney had not been found during the rather thorough operation of May 15th, this case seems to teach, as also does Case IV., that a microscopically crystalline deposit in the urine can descend from one kidney alone, and thus enter the bladder urine. This finding struck me as probably something new. Being unable to find in the current literature any remarks bearing upon it, I asked Dr. Howard A. Kelly, of Baltimore, regarding his experience in this respect. On April 15th, I received his answer, from which I extract, with the doctor's kind permission:

"BALTIMORE, April 13, 1897.

"DEAR DR. MEYER: . . . I have never observed uric acid on one side and none on the other, or any difference in this respect between the two sides. Your finding is certainly an interesting and important one. I will try to verify it on some of my patients.

"Sincerely yours,

"HOWARD A. KELLY."

Hitherto we have generally believed that the increased amount of uric acid (not gravel) in the urine is excreted by both kidneys.

CASE VII.—W. D——, sixty-two years of age, seen by me in consultation with Dr. L. Stieglitz, of New York City. Eight years ago, biliary colic; stone found in stool. Four years later, very sharp pain in left side, lasting four to five hours, and extending down to bladder and left testicle; slight fever; no stone passed. Then well for three years. November, 1894, persistent dull ache in right lumbar region. Examination by competent physicians proved negative. In the summer of 1895 extremely severe pain in same spot; slight fever; remained in bed for one week. November, same year, similar attack. Urine shows large amount of uric acid, but is otherwise negative. Within the last month and a half patient has had fully six attacks of colicky pain in the region of the right kidney, disappearing in from two to eight hours. Pulse never over 80; temperature 100° to 101° F. Within the last week more or less pyuria; urine is more turbid after the renal colic; no gravel. History with reference to tuberculosis and specific disease negative. Mother's parents may have died of phthisis; one child has Pott's disease.

Status præsens: Urinates every hour or two, nights once, never less than eight ounces. Prostate hypertrophied. Lumbar regions not painful on pressure; kidneys not palpable.

Urinary analysis, May 7, 1896: Amount, 1860 c.c. in twenty-four hours. Reaction acid. Specific gravity, 1.009 at 15° C. Amount of urea, 27.9 grams in twenty-four hours. Chlorides (approximate), 9.3 in twenty-four hours. Phosphates (approximate), slight excess. Albumin, good trace.

Microscopic examination: Very small amount of blood; fair amount of pus, forming bulk of deposit; also tubular plugs of same; small amount of mucus,

moderate number of hyaline casts; no tubercle bacilli, no gonococci; some cells from the superficial layer of the bladder, also some groups from the renal pelvis. Considerable amount of uric acid.

Diagnosis based on urinary examination: Moderate pyelitis, with but moderate renal hyperæmia. Slight secondary cystitis. Etiology, probably uric-acid stone or gravel.

In view of the clinical history, one had to diagnose right suppurative pyelitis, most probably due to a stone. To find out the health or disease of the left kidney as a preliminary to a probable operation to be done on the right, Dr. Stieglitz brought his patient to me for catheterism of the ureters. This was done three days later, on May 10th, at my office, as usual under cocaine anæsthesia. In spite of the hypertrophied prostate, the ureteral mouths were easily entered.

Amount of urine passed: Right kidney, 4.5 c.c. in 7 minutes. The catheter became clogged after seven minutes; attempts (lasting one-half hour) with catheter *in situ* were made to remove the obstructing plugs, but without success. After removal of the catheter the plugs were found within its eye and farther down in the lumen of the same. They were pressed out with some sterile water, and added to the amount collected. To facilitate examination, the specimen obtained from the right kidney was diluted by Dr. Sondern with an equal amount of distilled water. Left kidney, 15 c.c. in 15 minutes.

Reaction acid on both sides. Specific gravity, R., 1.002; L., 1.012 at 15° C., Westphal's balance. Amount of urea, R., 0.004 in 1 c.c.; L., 0.018 in 1 c.c. Chlorides (approximate), R., 0.0025 in 1 c.c.; L., 0.0075 in 1 c.c. Albumin, R., present, one-quarter per cent. per mille by weight; L., slight trace.

Microscopic examination: Blood, R., very small amount; L., small amount. Pus, R., fairly marked,

some necrotic in character, also tubular plugs; L., none. Mucus, R., fairly marked; L., none. Casts, R., numerous hyaline and few granular casts; L., none. Bacteria, R., no tubercle bacilli, no gonococci, many pyogenic organisms; L. none. Epithelium, R., many cells from the ureter and groups from the renal pelvis; L., numerous cells from the ureter. Crystalline and amorphous deposit, R., considerable uric acid and its salts; L., none.

Remarks based on this examination: "Specimen from the left kidney: The small amount of albumin present being accounted for by the blood, a relatively good excretion of urea and chlorides, and the absence of all renal elements, allow the conclusion that this kidney is normal. The blood and epithelial cells of the ureter are, as proved by former experience, probably due to the introduction of the catheter. I may note that there is no crystalline deposit from this kidney.

"Specimen from the right kidney: The very low specific gravity as compared with that of the other specimen, a marked diminution in the excretion of urea and chlorides, with the presence of albumin, numerous hyaline and few granular casts, pus, much of which is necrotic in character, tubular plugs of pus, considerable mucus, and many groups of epithelial cells from the renal pelvis, would indicate a pyelonephritis, with, I think, an abscess cavity somewhere. The plugs which occluded the ureter catheter, as before described, tend to substantiate the above. (They consisted of pus, tubular plugs of the same, few hyaline and granular casts, all of which were embedded in mucus.) The small amount of blood and epithelial cells of the ureter is probably due to the catheterization.

"As to the etiology: The presence of a considerable deposit of uric acid and its salts, and considering the fact that there was no crystalline deposit from the

other kidney, would allow the strongest suspicion that uric-acid renal stone or gravel constitutes the etiological factor."

Diagnosis based on this analysis: Left kidney normal; right kidney, rather marked pyelo-nephritis, with probably an abscess cavity. Etiology, probably uric stone or gravel.

In view of the continuous presence of some rise of temperature, and also of the fact that Mr. D—— intended soon to leave for his country residence in the northern part of the State, we proposed, after having carefully weighed the pros and cons as to the safest way, to have nephrotomy done on the right side in order to find and remove the stone. Before giving his consent, the patient decided to ask a number of prominent physicians and surgeons to give their opinion, submitting to them the analysis of the separately collected renal urine. The greater number of these gentlemen favored temporizing, especially as not long after the examination made by myself the fever disappeared. In the latter part of May, Mr. D—— left for his country home in charge of a trained nurse. Our agreement was that if the carefully outlined general treatment and the internal medication should not improve his condition, especially if the temperature should again rise and remain high, he should return to the city at once, ready for surgical interference.

Early in July, after a few days with marked vesical irritation, he passed an irregular stone per urethram, which, upon analysis, proved to consist entirely of uric acid. Soon after that the urine began to clear up. In August it was absolutely transparent, and the patient was in a splendid condition. He has remained well since that time.

This case nicely illustrates that the treatment of nephrolithiasis belongs to the domain both of internal medicine and surgery. Mr. D—— was lucky that in

continually flushing his kidneys with a large volume of water, according to our orders, the stone entered the uterer with its longitudinal axis parallel to that of the ureter, and also that it was not too large to travel down. Had this not happened, an operation would have had to be done sooner or later. For such an operation it certainly would have been a very welcome assurance to the surgeon to know that the opposite kidney was healthy.

In perusing the history of these seven cases, Mr. Chairman and gentlemen, it may seem rather queer that my last case of this kind should date May 8, 1896. But as I have stated in my previous paper (*loc. cit.*) and would like to emphasize here once more, I have catheterized the ureters according to strict indications only. I have never introduced the catheter into a ureteral orifice for the sake of gaining personal practical experience in this kind of work, and shall not do so in the future. As will be seen, I have done catheterism in the male only when a renal lesion had to be localized, when health or disease of its mate had to be determined, and, furthermore, when an operation on the kidney seemed urgent and would probably have had to be done sooner or later.

By a singular coincidence, all patients who needed catheterism of the ureters since that time have been female, and in every one of these I drained the kidneys at my office with the help of Casper's instrument. Of course, I have had under my care, within the last eleven months, quite a number of male patients with renal disease, but in none of them did I find the indication for nor did I carry out ureteral catheterism.

I might here mention a few of these cases for illustration: In a young man in whom the cystoscope showed a marked ulcerative unilateral vesical catarrh, the mouth of the left ureter in the centre of an irregular sore, and in whom no tubercle bacilli could be detected, the first indication was to make a suprapubic opening

into the bladder in order to scrape and cauterize the ulcerations and drain the viscus. Through the suprapubic opening a small catheter was then introduced into the ureter of the seemingly healthy side and fixed in front of its orifice by a catgut stitch. The urine collected in twenty-four hours proved the respective kidney to be healthy.

In a man of forty-seven, I had, in 1894, removed a papilloma of an apple's size from the right side of the bladder, which had been diagnosed by the cystoscope, resecting at the same time the vesical end of the ureter for a distance of two inches. In 1895, after repeated cystoscopy and a second suprapubic incision, from fifteen to twenty tumors of larger and smaller size were removed. In 1896, I successfully crushed a stone in his bladder, which I had seen through the cystoscope, notwithstanding the presence of a number of recurrent growths. Now, spring, 1897, his bladder is again full of recurrent tumors, and he has frequent pains in the left lumbar region. Analysis of the urine proved the presence of a pyelitis and the cystoscope showed a number of papillomata crowded around the left ureteral opening. In this case catheterism of the ureters would be impossible, because the mouth of the probably diseased side cannot be approached. The indication is suprapubic cystotomy for the third time, with catheterism of the ureters, provided this is found to be feasible.

In a man of fifty-three, with hypertrophy of the prostate, vesical catarrh, and occasional pain over the left kidney, urinary analysis showed a pyelitis but no crystalline deposit whatever. The patient feels comfortable, has very little residual urine. An operation certainly is not indicated at present. I did not catheterize his ureters. More cases could be cited.

With reference to the work itself, I can to-day repeat what I said a year ago: I consider the manipulation here in question an easy one, in the male

as well as in the female. I have not changed my views since then. To approach the ureteral mouth and engage the tip of the tiny catheter in the same is not a bit more difficult in the male than it is in the female.

Of course, in order to be successful, a perfect familiarity with cystoscopic work is required. He who thinks that for catheterism of the ureters in the male it is merely necessary to buy Casper's or Nitze's instrument and then to proceed, is very much mistaken, and will no doubt be disappointed in his attempts, surely in his first ones. I had practised cystoscopy with Nitze's instrument in the male and female for fully eight years, before I catheterized the ureters in the male for the first time. The reason for this was not that such a long preparation is needed, but simply because a useful instrument was not to be had sooner. Such was not for sale before 1895. But during these eight years I had learned in many hundreds of cases how to find the ureteral openings, even under adverse and difficult conditions. I had learned how to approach them, even in such cases. For half-hours at a time and longer did I, in a great number of instances, uninterruptedly watch the ureteral jets for the sake of determining the transparency or turbidity of the descending urine. I had carefully timed the outflow with a view to finding the working coefficient of the respective kidney. Often did I do this for so long a time that I was forced to stop because of the running of my eyes due to the severe strain. If the cystoscopist knows how, I might say, to "handle" the ureteral openings, he will surely enjoy this kind of work, as I have done from the very beginning.

But he who does this sort of work in the male should always have made up his mind to proceed with patience and perseverance; he must not be in a hurry. My patients come on special appointment. It has taken me at times fully two hours before I got

through. and then I had. in one instance. to be satisfied with the collection of 4.5 c.c. from the one kidney (Case VII.); in another case the catheter did not give exit to any fluid whatever on the one side (Case III.). But the reason for this annoyance was not the difficulty of the procedure, but some mechanical obstruction of the catheter's eye or lumen. Plugs of descending pus, the smallest amount of coagulated blood, with some pushed-off epithelial cells of the ureter, may easily obstruct the eye of the tiny catheter.[1] If repeated aspiration with a powerful syringe attached to the outer funnel-shaped end of the ureter catheter does not soon make the urine flow through the catheter, one ought to pull back the catheter's tip into the bladder, then wash the canal out with sterilized boric-acid solution, the eye of the ureter catheter being within the vesical fluid, and then reintroduce the instrument. As mentioned above, I did this manœuvre in the case of a lady three times. At the fourth reintroduction urine at last began and continued to flow through the catheter.

I further wish to mention the necessity of good assistance when catheterizing the ureters. I believe it is impossible to do good ureteral work in the male without a trained hand at one's side. I have so far always had and needed the help of my office nurse. She thoroughly knows what I want, how to fix the cystoscope and the catheter when I pull out the mandrel, how to steady the instrument when the catheter is *in situ*, etc. All these points to be observed when carrying out the work may at first glance seem cumbersome and superfluous, yet I deem them absolutely essential for successful ureteral work in the male.

[1] The conclusion that in such a case the introduction of the catheter into the ureter has produced a mechanical reflex anuria of the kidney is, I believe, an erroneous one. We know this to appear even in the opposite kindney in consequence of ureteral (partial or complete) obstruction by a calculus. But I do not believe that the catheter which only partially fills out the lumen of the ureter can bring forth this phenomenon.

In summing up these remarks I should say that repeated disappointment in the early time of ureteral work in the male should not discourage the cystoscopist. On the contrary, it should stimulate him to further trials (efforts). The reason for his failure should be sought rather in lack of experience in intravesical cystoscopic work, and also perhaps in lack of proper assistance, than in the imaginary defect of the instruments used for this purpose. Both of the ureter cystoscopes now in our hands are useful and do not need special improvement.

In order to be successful in using Casper's instrument, one will do well, I believe, to follow the rules I have laid down in my former article, repeatedly referred to, rules which I have found practical by personal experience. They are, briefly repeated and revised, and extended after my additional experience, as follows:

1. Wash and cocainize the bladder according to well-known rules.[1]

2. Fill the bladder with from five to seven ounces of clear fluid.

3. Introduce the instrument. For this purpose the ureter catheter should be pushed down to the internal opening of the canal of the cystoscope; the lid of the latter should be pulled out about one-third inch.

4. As soon as the beak has entered the bladder the catheter should be gently pushed forward into the vesical cavity by about one-half to three-quarters of an inch, and then the lid should at once be pushed back into place, *i.e.*, it should be fully closed.

5. After the interior of the bladder has been satisfactorily inspected and the ureteral openings have come into view, approach one of them.[2]

6. Let the ureteral opening appear at the very end

[1] See author in Morrow's "A System of Genito-Urinary Diseases," etc., vol. i., p. 456.

[2] For particulars I refer those interested to my previous article.

of the cystoscopic picture, farthest away from the middle of the bladder, but keep it under your direct inspection, with the prism as near to it as possible.[1]

7. Push the catheter gently forward; if the beak's direction is a proper one, *i.e.*, if it is parallel with that of the lower end of the ureter, I am sure the ureteral catheter will almost invariably easily enter the mouth, when conducted by a trained hand.

8. Allow the catheter to proceed not more than one or two inches into the ureter, and withdraw the wire mandrel. Then, as a rule, urine will begin to flow drop by drop at intervals or continuously.

By faithfully adhering to these rules in my work, I have invariably been successful. Of course, the number of patients thus treated is not yet very great. But, so far, I can repeat conscientiously that whenever, whether in male or female, I have been able to see and approach the ureteral opening, I have also succeeded in introducing the catheter into the same. I have specially added the words "so far," because I have no doubt that I may probably encounter cases in the future in which my attempts will not be crowned by success, although the ureteral openings can be well seen and approached. But up to date there has been only one among all my cases, male and female combined, that of a lady, a patient of Dr. E. F. Cushier and Dr. Robert F. Weir, of this city, in which I have failed in my repeated attempts, although I saw the opening very distinctly before me. However, in this

[1] This is a very important rule. Lately I received a letter from a gentleman in Boston who is interested in this work and studied in Berlin under Nitze and Casper. He possessed the latter's instrument. He complained of not having succeeded so far, a single time, in entering the ureteral mouth with the catheter. He wanted to come to New York and see me do the work. I wrote him to proceed according to Rule 6. Five days later I received another letter. The colleague was delighted. At his first attempt he had accomplished the task.

patient I afterward also failed with Kelly's method in repeated sittings. There was no catheter or probe small enough, metal or flexible, to enter the mouth. The reason for this was partially, as had been primarily well ascertained with the cystoscope, that the ureter emerged, not as is usually the case, at the innermost end of the ureteral intravesical fold, *i.e.*, nearest the trigonum, but about one centimetre away from it upwardly. The consequence was that the ureter catheter, in order to pass on, would have had to turn in a sharp angle right after its entrance into the ureteral mouth. This seemed not feasible. Besides, the mouth of the ureter was constricted, evidently congenitally. Such strictures we have to put on a basis with the congenital narrowness of the external meatus, so often found in the male. By chance, I nevertheless succeeded in determining the question at issue, viz.: Is the opposite kidney healthy? I may add this here, because the case really was a perplexing one. There had been an intermittent renal pyuria for the last two years. The right kidney was large, easily palpable, slightly painful to the touch. At the third sitting it struck me at once that, when washing out the bladder, the water returned clear from the beginning. I concluded that on this day the ureter of the diseased side was most probably temporarily obstructed. Cocainization of the bladder was somewhat prolonged on account of making preparations for the following work. It may have taken in all about six or seven minutes. During this time the patient, who had taken a great deal of fluid before coming to my office, discharged five ounces (!) of urine into the bladder. Instead of drawing off 50 c.c. of the cocaine solution and perhaps 10–20 c.c. of meanwhile admixed urine, I measured 200 c.c. (50 c.c. of a two-per-cent. solution of cocaine had been injected by me). On viewing the bladder after Kelly's method, I saw that the ureter of the presumably diseased side, which emptied within the

centre of an irregular ulceration, did not discharge a drop of fluid. Examination of the 200 c.c. of mixed cocaine solution and urine proved the latter to be perfectly normal. In other words, there was a well-working, healthy opposite kidney. Dr. Weir successfully removed the diseased kidney. The operation, as well as the specimen thus obtained, proved to be of unusual interest.[1]

Whether we should advise patients to take a large amount of fluid before examination is still a mooted question. In the male I believe it is a wise plan. As explained in my former article, in the male we must drain one kidney after the other; if possible, of course, always in the same sitting. That is to say, we can generally not leave the catheter first introduced into one ureter in place; liberate it; catheterize the opposite side, leaving the catheter there also *in situ;* remove the cystoscope. There will be few urethræ found in the male of sufficiently wide calibre to allow properly moving the cystoscope with the catheter at its side within the urethra. It may often be possible under general narcosis. The latter, however, it seems to me, should, for obvious reasons, be avoided as much as possible in this procedure. We drain the kidneys separately for renal disease. And ether as well as chloroform is detrimental to the renal tissue. So far, I have never used or needed general anæsthesia for my ureteral work. This, as mentioned above, has been office work throughout.

In the male we are, therefore, limited in the time. The sooner the patient gets through the better. The more fluid he has taken before the examination, the more rapidly his kidneys will work. Of course, due weight must be given this point in drawing conclusions from the urinary analysis. However, as both

[1] *Cf.* Report of New York Surgical Society, meeting of March 10th, "Annals of Surgery," 1897.

kidneys have been subjected to greater work at the same time, mistakes can be avoided by a competent analyst.

In the female the case is different. Both kidneys may be drained for hours, provided we do the work at the patient's home or at the hospital. The urine from each can be separately collected in proper bottles put into the bed. We certainly can state the fact: Urinary analysis will be more satisfactory without diluting the renal secretion too much by previously ingested fluids.

With reference to finding out the amount of work done by each kidney within a given time, I formerly counted the drops that were discharged through the ureter in a certain number of seconds, and also counted the intervals between the different discharges. I have discarded this method since I have distinctly seen jets of urine at the ureteral opening enter the bladder with the ureter catheter *in situ*. The urine evidently often drains alongside the catheter besides passing through its lumen. The catheters which accompany Nitze's ureter cystoscope are of more use in this respect than those of Casper's instrument. The former have an end hole behind a scoop-shaped lengthening of the material of which the catheter is made, the whole thus forming a sort of bougie. The latter carry the eye at the side. Nevertheless I believe that timing the number of drops discharged through the ureteral catheter is an unreliable observation.

My whole ureteral work with a cystoscope according to Nitze's principles has, so far, been done with Casper's instrument—this for the simple reason that the first specimen of Nitze's reached me in a damaged condition. Before it was exchanged by the factory, more than half a year elapsed. I shall certainly try it the first opportuniy that offers.

Whether in the female one should make use of a cystoscope constructed on the Nitze plan, or of Kelly's

instruments, is really a matter of taste. The manipulation with the imported ureter cystoscope certainly is a very gentle one; it is also very comfortable for the patient. She rests on her back in the position used by us for bimanual vagino-abdominal palpation.

A trained cystoscopist should, in my opinion, be master of all methods "that have proved useful and can be made use of for this purpose." In many instances he may, even in the female, succeed with the one method or instrument when the other failed for certain reasons.

In the male we have no choice. As explained at length above, Kelly's method for catheterism of the ureters is here a technical impossibility. We need instruments which carry the electric light into the bladder, and enable us at the same time to inspect and catheterize the ureteral openings by looking through a telescope and guiding the catheters through a separate channel.

With regard to the indication for catheterism of the ureters, it is, in my opinion, our duty to try and separately collect and analyze the secretion of each kidney "*in the male as well as in the female*" in all so-called obscure urinary diseases, provided the analysis of the bladder urine points to a renal lesion. It becomes our solemn duty to establish the presence, the health or disease, if possible also the working power, of the opposite kidney if nephrectomy has to be done.

If physicians will come to appreciate the importance of this now feasible examination, and make it a point to have cystoscopy and catheterism of the ureters in the male as well as in the female added to the other means at their disposal for arriving at a definite diagnosis, then the so-called obscure urinary diseases will at last become a thing of the past also in the male, and our diagnosis in the majority of such cases will from mere guesswork be put on a strictly scientific basis.