

In the fourth of our "misses" there was dysphagia, but as this was associated with paralysis of the left vocal cord and an x-ray shadow interpreted as aneurysm or mediastinal tumor, we were thrown off the track. Hoarseness or aphonia (such as occurred here) was present in two other cases and should be remembered as a not uncommon sign of gullet cancer.

The percentage of wrong diagnoses in this series would have been larger but for the routine use of the esophagoscope in the later cases. Dangerous though this procedure is in any but the most experienced hands, it is yet a necessity for accurate diagnosis of the cause of gullet obstruction in many cases.

One case with hematemesis and intermittent (not constant) dysphagia had been considered a functional or spasmodic rather than a cancerous stricture until esophagoscopy revealed its true nature.

LATENCY OF ADVANCED PHTHISIS IN DIABETES MELLITUS

Though the frequency of phthisis complicating diabetes is a familiar fact, it is not generally recognized, I think, that there is a peculiar latency and lack of symptoms in this type of tuberculosis. In thirty-nine autopsies in cases of diabetes there were nine cases of active tuberculosis and not one of them was recognized in life. In one other case tuberculosis was diagnosed but pneumonia (not tuberculosis) was found. Most of these patients had no expectoration and slight or no cough—quite a different clinical picture from that usually seen in non-diabetic cases of phthisis in the same stage of the disease.

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ABSTRACT OF DISCUSSION

DR. CHARLES G. STOCKTON, Buffalo, N. Y.: Two years ago in St. Louis Dr. Cabot delivered an address which I think was epoch-making in diagnosis in internal medicine. I have made it a practice to reread that address each year since then, and I commend the practice to my fellows here. It is a matter of great importance that one is able to carry out such a study in an institution where the records are so carefully kept and the examinations so well made. I should like to inquire, however, why such an inquiry had not been made before. Why is it not possible to do the same to-day in other institutions similar to the Massachusetts General Hospital? In most hospitals the records are not of a character permitting a review which would give valuable information.

If nothing else comes from my remarks I hope that they may stimulate a desire to secure better and more uniform systems of records, so that more certain results may follow summarization. If this were done we would have an enormous mass of statistics from which we might make estimations that would be invaluable. Think what would follow if the men here present would present their results as these have been presented to-day by Dr. Cabot. Of course this requires the opportunity, and it requires the man as well.

What Is Dirt?—It is by hygienic precautions that certain diseases are prevented, and the basis of bacteriology is experiment in animals. But I should like to quote again from Professor Halliburton on the general questions of serum treatment, which has been stigmatized as "messy," besides some less elegant criticisms. "Filth or dirt," he says, "has been well defined as matter in the wrong place. Blood on a carpet, for example, is certainly messy and dirty; it ought not to be there. But blood or serum in the heart or in the arteries and veins is in its rightful place, and it does its duty of nutrition where it comes into more immediate contact with the tissues—the small tubes we call the capillaries. One of these duties is to exert a protective influence on the whole body, by destroying the germs of disease which get into the body in spite of all precautions." —F. M. Sandwith in *Clin. Jour.*

PATHOLOGIC LESIONS OF THE KIDNEY ASSOCIATED WITH DOUBLE URETERS

REPORT OF CASE OF HYPERNEPHROMA *

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In all branches of medical practice it is a great joy to the physician accurately and minutely to fix the seat of disease. Localization of trouble in one kidney with simultaneous exclusion of it from its fellow is such an old story to the urologist that this really clean-cut diagnosis no longer arouses amazement. Yet when some fortuitous anatomic or other condition makes possible a closer localization of a pathologic lesion, his enthusiasm is aroused. After all, in the apparently simple cases perhaps he is sometimes too sure of himself. Anomalies in the excretory apparatus may seriously upset his calculations and at times lead to most disastrous results to the patient. My interest in the subject of anomalies has been keenly aroused by the following case:

REPORT OF CASE

Patient.—A married woman aged 43, entered the Presbyterian Hospital of New York City, Jan. 23, 1912, in the service of Dr. Joseph A. Blake, to whom I am indebted for the privilege of making this report. The patient had pneumonia three years before admission, and had coughed blood one year before; a supravaginal hysterectomy had been done three months before admission.

Present Trouble.—The patient had attacks of hematuria and pain in the right lumbar region. One year before, the patient had felt a sharp non-radiating pain in the right lumbar region, lasting several hours. The next day very bloody urine was passed. A similar attack occurred six months later, and several more subsequently. There had been no frequency of urination and no loss of weight. Occasional night sweats and some cough were complained of recently.

Examination.—The patient was a small, thin woman, perhaps slightly emaciated. The heart was normal. The lungs showed a few scattered râles. The abdomen revealed nothing abnormal; the right kidney was easily felt, smooth, not tender, not much enlarged; the left kidney was not felt. By the vagina, a small cervical "polyp" was palpated. The urine the first few days contained a trace of albumin, little pus, sometimes a few red blood-cells, an occasional granular cast, no tubercle bacilli.

Cystoscopy and Catheterization.—I was asked to try to determine the source of the hematuria. At the time of my first examination (January 27), the catheterized bladder urine was clear and microscopically free from both pus and red blood-cells. Cystoscopy was easily performed, and an excellent view of the bladder obtained. It presented no tumor or calculus, and the mucosa was entirely normal. The left ureteral orifice was of normal appearance and in the usual position, and functioned normally. In a corresponding position on the right side of the trigon was an orifice with a similar normal elongated contour. About 5 mm. dorsosuperior and apparently a little mesial from this orifice was a smaller and round depression which was seen to function as a ureteral mouth. Careful observation revealed entire independence of action of these two right ureteral openings. They were both easily catheterized and the catheters (No. 6 F.) were introduced about 25 cm. A typical intermittent flow was obtained from each, and 5 c.c. of urine simultaneously collected from each in the same interval of time. The specimen from the cephalic orifice was almost clear, contained 0.4 per cent. urea, no pus, and few red blood-cells. That from the caudal orifice was bloody from the start (a suggestive point, I think), con-

* Read in the Symposium on Renal Surgery and Pathology in the Section on Genito-Urinary Diseases of the American Medical Association, at the Sixty-Third Annual Session, held at Atlantic City, June, 1912.

tained only 0.2 per cent. urea, no pus and much blood. The cystoscope was removed from the bladder, catheters being left *in situ*, fitted with another pair of catheters and reintroduced. The catheters on the right side were noted to be in position, and the left ureter then catheterized. Its outflow was nearly clear, was microscopically negative but for a few blood-cells, and contained 0.6 per cent. urea.

Urine Test.—A phenolsulphonephthalein test was done, 6 mg. being injected intravenously. Color first appeared in the urine in four and one-half minutes. During the subsequent half hour the catheter in the caudal ureteral mouth discharged urine very slowly. In the first fifteen minutes the left ureteral catheter gave 12 c.c. of urine and 16.4 per cent. of the drug, the right "cephalic ureter" (an inexact phrase used for

caudally placed ureter mouth was definitely associated with the lower (the caudal) portion of the right kidney. This lower portion of the kidney, then, represents a smaller amount of renal excretory function, according to the tests, than the upper portion of the right kidney, yet it is represented on all our x-ray plates by a larger renal pelvis (but by an abnormal one) draining a larger superior-inferior area. In view of this radiographic evidence, the function tests, the immediate appearance of blood when the ureteral catheter was passed up to the lower renal pelvis, and the negative bladder examination, the assumption seemed well grounded that if the blood came from the urinary tract, it had its origin in the lower pole of the right kidney and most likely in a neoplasm of this region.

Because of the presence of cervical polyps, some doubt was felt as to the source of the blood. These polyps were removed. Marked hematuria, however, recurred and bladder catheterization fixed the responsibility on the urinary tract.

Operation and Result.—February 24, Dr. Blake operated through a right lumbar incision. The fatty capsule of the kidney was adherent on the lower posterior surface. A tumor in the kidney substance was evident, and nephrectomy promptly done. Blood-vessels entering the lower pole of the kidney interfered with the dissection toward the pedicle. They were divided between clamps, which also included the lower ureter, as was clear later. The operation proceeded as usual. Most of the perirenal fat was excised. Convalescence was normal and progressive, the temperature never above 100 F., and a good output of urine was noted daily. The patient left the hospital March 17.

Pathologic Report.—The kidney (Figs. 3 and 4) is 12 cm. long and 4 cm. in thickness. Presenting from the lower half

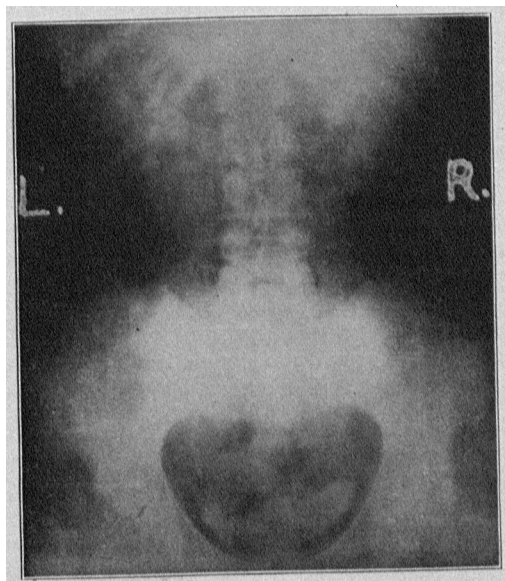


Fig. 1.—Radiograph with 20 per cent. argyrol. Left pelvis normal; lower right pelvis with tongue-like shadows at lower part; upper right pelvis very faint.

breavity) 8 c.c. and 7.2 per cent., the right "caudal ureter" 2 c.c. and 0.3 per cent. In the second fifteen minutes the left catheter gave 8 c.c. and 11.7 per cent., the right cephalic 5 c.c. and 3.5 per cent., the right caudal 1.5 c.c. and 0.4 per cent. Attention is called to these facts. Making abundant allowance for a possible extra catheter flow from the caudally placed ureteral mouth, it is to be noted that the right ureter with the cephalic orifice produced less than half as much phenolsulphonephthalein as the left ureter, and that the right "caudal ureter" produced less than half the amount recovered from the "cephalic ureter." It is to be remembered also that the urine from the two right ureters contained about the same relative percentages and amounts of urea, that is, twice as much from the cephalic as from the caudal ureter. In other words, the lower (the caudal) ureter mouth was associated with renal tissue of about half the functional ability (at least for excretion of urea and phenolsulphonephthalein at the time of the test) of the renal tissue drained by the other right ureter.

Argyrol Radiographs.—With the three ureteral catheters *in situ*, argyrol 20 per cent. was injected into each and a radiograph taken. It showed a normal left renal pelvis and ureter, and a smaller right renal pelvis with two thin shadows radiating inferiorly and laterally. Mesial to its ureter, another and fainter line was evident, leading up to a poorly outlined elongated shadow above the right pelvis just described (Fig. 1).

Skiagraphic catheters were passed into the two right ureters, February 2. The catheters were carefully marked, and the one entering the caudally placed ureteral orifice was injected with argyrol (through a misunderstanding it was again only 20 per cent.) and a radiograph taken. The other catheter was then injected till slight discomfort was produced, and a second plate exposed (Fig. 2). In this way the

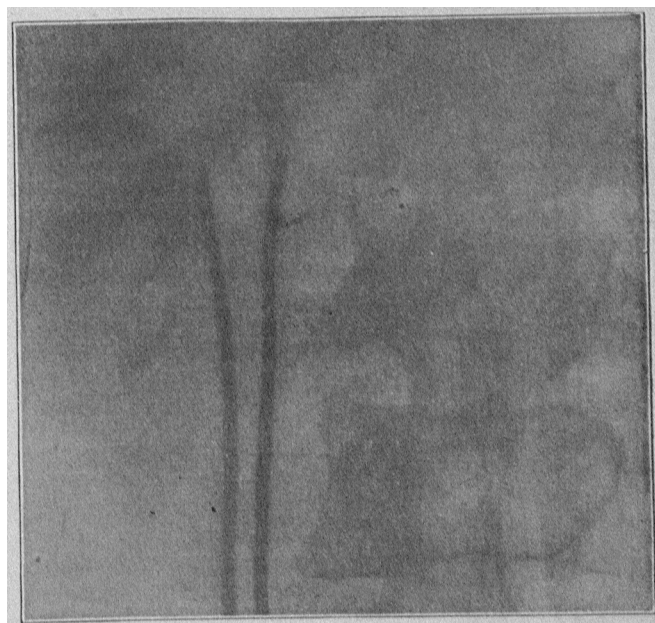


Fig. 2.—Radiograph with 20 per cent. argyrol (too weak), showing two right renal pelvises overlapping (non-communicating), and lead-impregnated catheters in double ureter.

of the posterior surface, is a lobulated round sharply outlined tumor 4.5 cm. in diameter, with a very definite connective-tissue capsule. On cut section of the fresh specimen, the tumor is seen to form definite lobules arranged in the most part about a common center suggesting a hilum; the color is light yellow. The renal parenchyma of the upper part of the organ is normal in appearance and thickness. The upper pelvis presents two major subdivisions, each in turn draining three calices, two placed posteriorly, one anteriorly. These calices are all intact, are not associated with the tumor, and do not connect with the other pelvis. The lower pelvis is greatly flattened by pressure of the tumor and can be identified only with difficulty beyond its primary dilatation. The

blood-vessels entering the kidney are distributed along the anterior aspect of the hilum, and a few posterior to the lower pelvis. None of the veins contain tumor material.

Microscopic Examination.—Microscopically the tumor shows a mass of large epithelial cells with relatively small nuclei and clear cytoplasm, arranged in alveoli supported by a very delicate framework of connective tissue branching from dense trabeculae. At points the alveoli form an adenomatous structure. The tumor seems well encapsulated and no invasion of renal parenchyma or pelvis was found. It evidently belongs to the group of tumors classed as hypernephromas, and was so diagnosed by Dr. W. C. Clark of the pathologic department of the hospital.

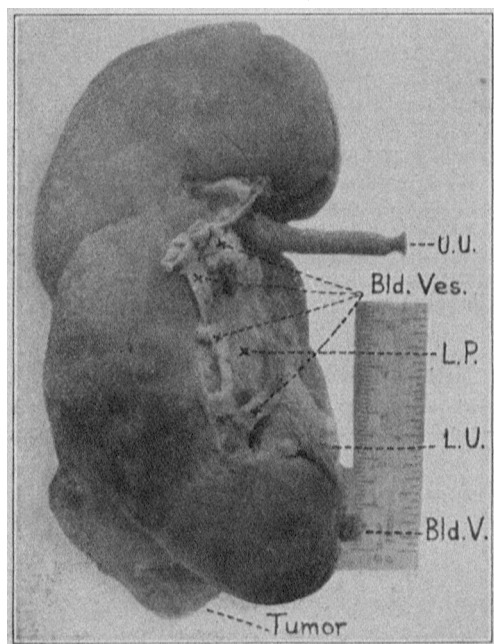


Fig. 3.—Anteromesal aspect of right kidney: U.U., upper ureter; L.P., lower pelvis; L.U., lower ureter. Lower ureter clamped and cut at operation with blood-vessels marked Bld. V.

LESIONS ASSOCIATED WITH DOUBLE URETERS

Double ureters may be incomplete or complete; that is, they may join and enter the bladder through a common opening or may remain apart and enter the bladder through independent openings. Normally in embryonic life the renal bud, soon after its appearance as an outgrowth from the wolffian duct, splits terminally into cephalic and caudal portions, which ultimately become the two main divisions of the pelvis. That portion of the wolffian duct between the renal bud and the cloaca becomes absorbed in the cloaca, thus affording separate openings for ureter and wolffian duct (the future vas deferens). Double ureters are thought to originate from double budding from the wolffian duct or by extension downward of the split occurring normally at the end of the renal bud. It seems likely that an extra renal offshoot gives rise to another fully developed pelvis and its development in adult life should be regarded as a supernumerary kidney, whether separated from or joined to its neighbor of the same side. The cleavage process, however, is regarded as the more probable explanation of reduplication of ureters (Meyers,¹ Pohlmann,² Huntington³). When the cleavage is complete, one finds completely double ureters — ureters with independent openings in the lower urinary tract. Subse-

quent development and unequal growth of the region of the lower ends of the ureters cause an apparent rotation which brings the orifice of the ureter from the upper pelvis mesial to and usually mesial and caudal to the orifice of the ureter from the lower pelvis, and the opening of the wolffian duct caudal to the ureter. Moreover, the lower pelvis, which as a rule is the larger, usually empties into the bladder at the normal site for a ureteral opening on the trigon.

I have outlined briefly these features of development to call attention to the fact that in the case here reported, the ureter from the lower pelvis did empty into the part of the bladder normally receiving a ureter; but contrary to rule, its fellow opened not distal but proximal to it. I have found but one other such instance, a report by Kerr⁴ of an exactly similar relation of orifices of double ureters in a post-mortem observation.

It will be noted that, according to the x-ray plates, the ureters do not cross in their course from kidney to bladder. If they cross in a given case they must recross, as the ureter from the upper pelvis starts mesial and ends mesial to its fellow.

Because of the idea that many neoplasms have as a basis some congenital abnormality, and regardless of one's views concerning the histogenesis of hypernephromas, one is at first impressed with the association of this renal tumor with a congenital anomaly of the collecting apparatus. Yet embryologically I can see no

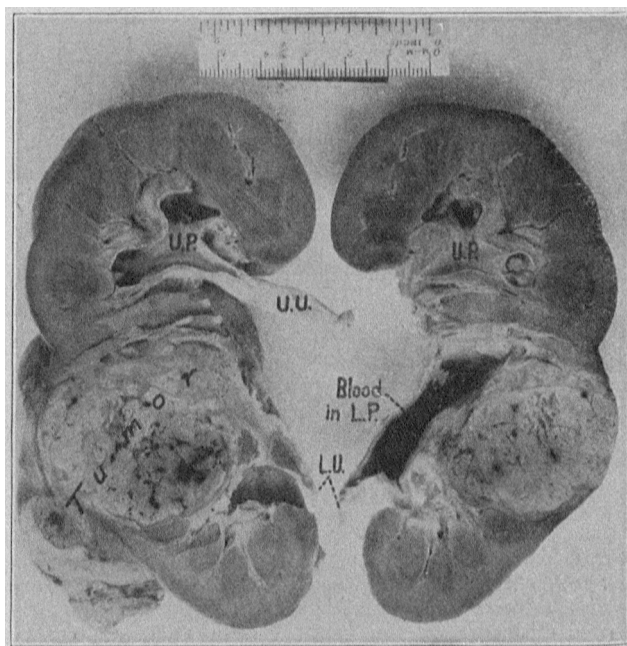


Fig. 4.—Section of right kidney through both pelves: U.P., upper pelvis; U.U., upper ureter; L.P., lower pelvis; L.U., lower ureter.

relationship beyond the possible evidence of a general tendency of the particular organism to congenital abnormalities. The reduplication usually concerns the collecting apparatus only, not the kidney parenchyma which is derived from another and very different source. In fact, in these cases of double ureter the kidney has as a rule the contour of a normal organ; moreover, I have found no other instance of hypernephroma of the kidney associated with double ureter and pelvis. The nearest approach was a case of Kapsammer⁵ — hyperne-

1. Meyers: Virchows Arch. f. path. Anat., 1907, clxxxvii, 408.

2. Pohlmann: Am. Med., 1904, ii, 987.

3. Huntington: Harvey Lecture, 1907.

4. Kerr: Anat. Rec., 1911.

5. Kapsammer: Nieren-Chirurgie, 1907, 1, 2.

phroma of the right kidney and double ureters from the left kidney.

Contrary to the view of older writers, ureter duplication, in part or in whole, has a decided clinical interest and importance but only in recent years has a diagnosis been made before operation or necropsy. Kapsammer observed in 1905 perhaps the first case of bilateral complete doubling of the ureters diagnosed during life. The four orifices were catheterized and the two pelves of each kidney proved non-communicating by the injection of indigocarmin into one ureter and its failure to return through the other. The two right ureters gave normal urine; both left ureters discharged a little pus. This was cleared up by lavage.

Seelig⁶ reported last year another case (observed in 1910) of this bilateral complete duplication with radiographic plates showing collargol in the four pelves and bismuth-impregnated catheters in the four ureters. Clinically his observations were most interesting—the right upper pelvis gave albumin and epithelial and blood-casts; the right lower pelvis, normal urine; the left upper pelvis, a definite amount of pus but no casts; the left lower pelvis, only a few leukocytes.

B. Lewis⁷ and Newenow⁸ reported cases of double ureters on the left side, with clear urine from one and pus (and gonococci in Lewis' case) from the other (determined by catheterization). The infection in both instances was cleared up by pelvic lavage.

Similarly Franke (quoted by Pasteau⁹) in a patient with two ureters from the right kidney, found one ureter excreting clear, and the other purulent urine. By operation, an artery crossing and partially obstructing one ureter was divided, and the patient's symptoms were relieved. Kapsammer's case of extensive tuberculosis of a left kidney having complete double ureter is of no special significance in this connection.

Of the reported cases of renal diseases associated with incomplete double ureter, those of Stark¹⁰ and Wulff¹¹ are notable as having been correctly diagnosed before operation. The former on different days obtained clear and purulent urine from the left kidney, the output from the right kidney being always normal. Stark inferred that there was a bifurcation of the left ureter, and that his catheter had entered different pelves on the two examinations. Operation confirmed the diagnosis. The upper part of the kidney was normal, as was its ureter; in the lower part there was a pyonephrosis, and its ureter was much thickened. Stark feared infection of the remaining portion should he attempt a resection of the kidney, and consequently did a complete nephrectomy. Subsequent recurring infection of the bladder from the ureteral stump would seem to confirm his judgment. Wulff, in his case, obtained purulent urine from the ureteral catheter in the left ureter, but clear urine when this catheter was pushed higher. A forked ureter with two pelves, one infected, the other normal, was found at operation.

Rafin,¹² Kapsammer,⁵ Israel¹³ and Dumitreanu¹⁴ report instances of infected kidneys each with two pelves and two ureters (i. e., a double ureter in at least its upper portion), discovered only at operation. In all of

these four specimens, the infection (tuberculosis in Kapsammer's patient) was confined to the part of the kidney associated with one pelvis; while the other portion of the organ was normal. Kusnetsky's case¹⁵ was similar; additional interest was afforded by the presence of a large stone in the ureter associated with the pathologic pole of the kidney, at the junction with its fellow ureter.

Bruci's report¹⁶ concerned a like condition superficially. One end of the organ was virtually a pus sac, but the other with its ureter appeared normal. On section this supposedly normal pole showed miliary abscesses and intense interstitial infiltration. An attempt at resection here would have been worse than futile. Nevertheless a successful resection of a pyonephrotic sac with a part of its ureter, leaving the upper portion of the kidney and its ureter, was reported by D'Lennander.¹⁷ He first did a lumbar nephrotomy, and later appendectomy and the partial nephrectomy through an abdominal transperitoneal wound. Probably one would feel justified in doing a heminephrectomy in few cases of infection of one-half a kidney with two pelves and ureters, for fear of subsequent involvement of the remaining portion. Just which cases are suitable is a matter for individual judgment. The difficulty of such an operation would depend largely on the arrangement of the blood-vessels. If the kidney substance should possess independent blood-supply at either end, and the intervening portion be of smaller diameter than the ends, as in Albarran's case,¹⁸ the operation is comparatively simple. His patient had a lumbar fistula following nephrostomy performed by another surgeon. Ureteral catheterization disclosed a normal left kidney and a good quality of urine coming from the right ureter. Fluid injected into the latter did not come out of the nephrostomy wound. The anomalous condition found at operation was not suspected before. Albarran speaks of the findings as "two kidneys" placed one above the other, joined together, but each having its own blood-supply as well as pelvis and ureter. The upper end was pyonephrotic and was excised. Apparently no mention is made of the termination of the ureter from the excised kidney. If it ends in the neighboring ureter, one ureter probably represents embryologically an abnormal sprout from the other ureter. Such an explanation was offered by Huntington for a similar museum specimen.

The reports of Young¹⁹ and Key²⁰ demonstrate that double ureters may be the cause of serious mistakes. The former recited the details of an interesting well-studied case of renal calculus. Pus was obtained from the right ureter, clear urine from the left. A radiograph showed a large calculus filling the right renal pelvis, but none in the left kidney. Right nephrolithotomy was performed. The autopsy disclosed two pelves in the left kidney, and two ureters joining before reaching the bladder. The upper pelvis contained calculi and pus but its ureter was plugged up, and the ureteral catheter passed on the left side went up to the normal pelvis. The x-ray plate had been placed too low to show the left renal calculus. Briefly, Key's patient presented a double renal pelvis on the right side. There had been pus in the urine, but none was present at the time of the examination. A radiograph gave a shadow mistaken

6. Seelig: *Ztschr. f. Urol.*, November, 1911.

7. Lewis, B.: *Med. Rec.*, 1906, lxx.

8. Newenow: *Fortschr. a. d. Geb. d. Roentgenstrahlen*, 1910, xvi, 157.

9. Pasteau: *Ann. d. mal. d. org. génito-urin.*, 1911, 1, 693.

10. Stark: *Ztschr. f. Urol.*, 1911, p. 466.

11. Wulff: Quoted by Pasteau: *Deutsch. med. Wchnschr.*, 1906, D. 1700.

12. Rafin: *Ann. d. mal. d. org. génito-urin.*, 1909, 1, No. 3.

13. Israel: *Chirurgische Klinik der Nierenkrankheiten*, 1901.

14. Dumitreanu: *Deutsch. med. Wchnschr.*, 1908, xxxiv, 1333.

15. Kusnetsky: *Ztschr. f. Urol.*, 1909, iii, 927.

16. Bruci: *Ann. d. mal. d. org. génito-urin.*, 1911, 1, 661.

17. D'Lennander: *Arch. f. klin. Chir.*, 1900, lxxii, 471.

18. Albarran: *Médecine opératoire des voies urinaires*, 1909, p. 265.

19. Young: *Johns Hopkins Hosp. Rep.*, 1906.

20. Key: *Ztschr. f. Urol.*, 1909, iii, 409.

for stone. This proved to be a tuberculous abscess in the upper part of the kidney. Here again the ureter draining this region was plugged, and only clear urine from the other pelvis reached the bladder from the right kidney.

Lastly, von Fedorow²¹ reports an interesting case. Two normal ureteral openings were seen which on catheterization gave normal urine from the right side and a little pus from the left. Lateral to the left ureteral orifice was a thin-walled cyst. At operation, this was incised, found to lead upward to a ureter running close to the other left-sided one but without connection with it. A plastic operation was done on the cyst, relieving the symptoms—pain in the left kidney and frequent and painful urination. Six months later, the original left ureteral orifice gave urine free from pus, while its fellow, which at first probably had only a very small bladder opening but now had a large one, produced urine containing pus.

I have arbitrarily omitted the general subject of stricture of the ureter (a matter thoroughly discussed in comparatively recent papers, notably that by Bottomley²²), and have considered only cases of double ureter presenting some associated renal lesion other than a possible hydronephrosis caused by congenital stricture of the ureter. In Bottomley's collection of fifty-six cases, eleven patients had supernumerary ureters.

Concerning the frequency of double ureters, Kerr⁴ reports four instances of unilateral complete double ureters in 165 dissecting-room subjects; Pohlmann,² two complete double ureters in over sixty embryos; G. M. Smith,²³ three incomplete double ureters (bilateral in two cases) in 100 autopsies; in general autopsy work, unilateral double ureters are recorded in from 1 to 4 per cent., and more frequently on the left than on the right side. I find no justification for Stark's statement that incomplete doubling is usually unilateral, and complete doubling usually bilateral. Complete doubling with two bladder orifices is rare compared to incomplete doubling (Huntington); yet, as several writers have pointed out, in the former cases the two ureters are bound tightly together in their lower third and a complete case might easily be mistaken for an incomplete case, unless the ureters are carefully dissected. Bilateral complete duplication of the ureters is decidedly less common. Gould²⁴ in 1903 reported two such autopsy cases and said that he could find but eight others in the literature; I have come across eight instances of this condition reported since 1903 (Kapsammer,⁵ Wwendsky,²⁵ Rendu,²⁶ Huntington,³ Furness,²⁷ Decherd,²⁸ Comolli²⁹ and Seelig³⁰).

Lichtenstern³⁰ reported a case diagnosed clinically as crossed ureters. I know of no such post-mortem observation. Kapsammer⁵ has seen three cases which he interpreted as duplication of only the lower end of a ureter, simulating an *inverted Y*. He records no radiographic demonstrations, or irrigation test such as he employed to prove absence of communications of the two pelves of a kidney with complete double ureters. Embryologically such a condition is "contrary to nature"

and most writers seem to think that it never occurs, but that for every ureteral opening in the bladder there is at least one renal pelvis that, when more than one, these pelves communicate rarely and only as the result of pathologic processes. As many as six ureteral orifices in one bladder have been reported (Schewkunenko³¹); and five cephalic divisions of one ureter (Glazebrook³²). When one searches for other possible stumbling-blocks, the various renal malformations and ectopias come to mind, and the occasional presence of a third kidney or the rare occurrence of but one kidney. The many possible terminations of ureters, other than bladder, must also be remembered.

In conclusion, if one will except the rare true cases of solitary kidney, when a blind ureter may be found on the other side extending up a short distance from the bladder, the inference is certain that for every ureteral orifice in the bladder there is a renal pelvis—perhaps more than one—and that these pelves do not communicate. Also there may be present ureters terminating at their distal ends blindly or in some part of the genital or urinary tracts other than the bladder. When a ureter crosses the median line to reach its associated kidney, that kidney is usually caudal to the one normally belonging on that side. Of two ureters running from one kidney to the bladder, that with the more mesial and more caudal opening almost always corresponds to the upper pelvis of the kidney. The history and general examination will offer valuable leads, but our surest means of diagnosing renal conditions accurately are careful comparative examinations of urines obtained by ureteral catheter, associated kidney function tests, and intelligent use of the *x*-ray. In baffling cases urine from different levels of the ureter should be collected and it is best to inject the silver solution through a large catheter first in the renal pelvis, then at successively lower points in the ureter, before radiographs are made.

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ABSTRACT OF DISCUSSION

DR. HUGH H. YOUNG, Baltimore: The surgery of the double ureter is very interesting and complex and frequently leads us into a wrong diagnosis. I reported just recently in New York before another society an interesting double ureter case, in which when I first looked into the bladder I saw a diverticulum, but when the patient strained an immense prolapse came out, over which I found the ureter. I operated and found, instead of a diverticulum, another ureter. In another interesting case, catheterization showed pus issuing from the right ureter and clear urine from the left. I took an *x*-ray plate which seemed entirely satisfactory and which showed a mass of stones in one kidney quite high up; on the other side I could see the apparent outlines of the kidney. The patient was operated on and promptly died of uremia. At autopsy we found that above the apparently healthy kidney was another kidney which had a big stone in it. The *x*-ray plate had just missed it. The patient had two ureters on that side in the upper part, and a single one below.

DR. EDWIN BEER, New York: I have seen during the last forty-eight hours one of the most baffling cases that I have had the opportunity of examining. The patient complained of chronic pyuria. In 1902, this patient had been operated on for subphrenic abscess. The abscess refused to heal, and a secondary operation was done by a New York surgeon, who removed the kidney which had been the source of the original abscess. The sinus again refused to heal, and a partial ureterectomy was done. The pyuria continued. Subsequently to the operation a fecal fistula developed. The patient was

21. Von Fedorow: *Ztschr. f. Urol.*, 1910, pp. 501, 860.

22. Bottomley: *Ann. Surg.*, 1910, p. 597.

23. Smith, M.: Personal communication.

24. Gould: *Am. Jour. Med. Sc.*, 1903.

25. Wwendsky: *Folia Urol. Lelptic*, 1911, vi, 345.

26. Rendu: *Bull. Soc. méd. d. hôp. de Lyon*, 1911; *abstr. in Ztschr. f. Urol.*, 1911, p. 974.

27. Furness: Case reported February, 1912, to G.-U. Section of N. Y. Academy of Medicine.

28. Decherd: *Am. Jour. Med. Sc.*, 1904.

29. Comolli: *Monitore Zool. Ital. Florence*, 1911, p. 113.

30. Lichtenstern: *Ztschr. f. Urol.*, 1908, p. 974.

31. Schewkunenko: *Ztschr. f. Urol.*, v, 851.

32. Glazebrook: Quoted by Dorland: *Surg., Gyn. and Obst.*, 1911, xiii, 303.

operated on for the fourth time as the fistula refused to close. The pyuria continued. There was a mild form of sepsis. A ureterectomy was done, but still the pyuria continued. The patient came to me about ten days ago. I washed the bladder out regularly, but the pyuria did not diminish. June 3 I cystoscoped him, and I found on the right side a ureter 25 cm. long, full of foul pus. On the other side there was no sign of a ureter, but an enormous pouch. At first I thought this was a case in which the surgeon had not taken out the ureter, although he had operated for the ureter on two occasions, but on further consideration I am forced to conclude that the patient must have had a double ureter. Another case bearing on the same question was a patient with a double ureter which we proved on the cystoscopic table. One ureter was closed; mesial to the ureter there was a tiny point from which indigo-carmin escaped. The second ureter was 37 cm. long, and at operation we found that it led to the upper pole, which was normal, the lower pole being the seat of a hydronephrosis.

DR. J. B. ROXBY, Swarthmore, Pa.: An experience in the dissecting-room for a period of years confirms the fact that a large percentage of double ureter cases are in existence without having been known. An interesting case was seen recently in which there was a double ureter on the left side; the larger ureter was draining a small segment of kidney, the superior portion, while the small ureter was draining the majority of the kidney substance inferiorly. The caliber of the pelvis of the upper kidney substance was very much greater than the caliber of the lower kidney substance.

DR. A. R. STEVENS, New York: Dr. Young's case of bilateral renal calculus was referred to in the paper, but I omitted it in the reading because of lack of time. According to various statistics, double ureter, either complete or incomplete, occurs in from 1 to 4 per cent. The latter figure is probably nearer the facts, and hence warrants thoughtful consideration of the subject and watchfulness for these anomalies. While one should be mindful of all the possibilities in a given instance, from the data afforded by radiographs taken after injection of argyrol or collargol in the ureters and pelvis one may learn precisely the course and cephalic ending of each ureter. Indeed, in some cases thought to be anatomically normal the shape of the pelvis may warn the observer of an overlooked ureter.

AN OVERLOOKED FUNCTION OF BARTHO-LIN'S AND COWPER'S GLANDS

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In the male and female of all the higher animals, in connection with the sexual system, are found two sets of homologous glandular organs, much of the importance of whose office seems hitherto to have been overlooked. These are Bartholin's glands in the female and Cowper's glands in the male.

The fact that Bartholin's glands supply a mucus for the lubrication of the entrance to the vagina during sexual excitement, and that Cowper's glands secrete a mucous fluid which acts in part as a vehicle for the seminal discharge has long been noted. But each has a supplementary office in connection with the discharge of the urine, to which, so far as I know, reference has never been made, though one of distinct importance.

Every one who has suffered with irritability of the neck of the bladder or the bulb of the urethra is aware that immediately after voiding the urine an intermittent contraction is experienced in these parts for several seconds, which then gradually fades away. Such contractions, no doubt constantly present in the healthy subject, are probably experienced by the whole class of mammals; they indicate a double function for the glands.

One of these functions has already been mentioned as being related to the requirements of procreation. The

other relates to the protection of the mucous membrane of the vestibule and adjacent parts in the female and of the urethra in the male against the irritating action of the urine.

When the urine is passed the mucous membrane is in large measure swept bare of its free mucus, and this privation Nature set out early to remedy. In accomplishing her purpose she found ready to hand the before-mentioned glands, already developed for the accomplishment of an important office in the way of facilitating reproduction. These glands, like all other animal tubes or hollow organs, have their walls constructed in part of an external layer of longitudinal muscular fibers and an internal circular layer, a plan of structure which seems to have come up from the worms.

As soon as the act of urination has ceased a contraction of the walls of these glands takes place, extruding mucus into the passages to take the place of that which has been washed away by the passing urine, thus protecting the denuded mucous membrane. The contraction of the gland walls is reenforced by that of the walls of the urethra in the male, and in the female, by the contraction of the muscles about the outlet of the vagina. It is probable, too, that in all cases a reflex stimulus is conveyed to the glands which causes an increase in the quantity of their secretion.

In the mare, the contraction on the spongy, yielding tissues within the sphincters is so considerable that the vulva becomes quite everted under its operation. In the females of many other animals a distinct intermittent protrusion of the vulva may be observed under similar circumstances.

In the practice of medicine this condition is often a matter of distinct importance. In a large percentage of males the secretion is poured out with sufficient copiousness to cause it to be discharged from the urethra as a stringy mass; and the cases are without number in which men have consulted their physicians about an imaginary spermatorrhea, or have shamefacedly submitted to be robbed by conscienceless quacks, when nothing worse was going on than a beneficent effort of Nature to protect the mucous membrane against irritation by the urine. To the advertising quack this delusion has proved to be a veritable gold mine; and if statistics could be gathered of the amount of money annually paid out to these gentry by uselessly alarmed multitudes, the sum would be found absolutely astounding.

Field of Prevention.—The more we study preventive medicine and sanitation the wider grows the field, until we find that our horizon is almost boundless, being coincident with man's energies and ambitions; and wherever he goes and whatever he does we must henceforth stand by his side and guide him safely. No longer can our efforts or duties be limited by the actual presence of disease entailing the necessity for cure or for prevention of spread. We begin with the cradle, and in ordering the proper diet, clothing, temperature, air and exercise for the young child and watching his eyes, teeth, ears, nose and pharynx, we give him a better start in life than his father had. We follow him through school with the same care and see that he does not overtax his growing muscular system at football, baseball, rowing, track or gymnasium. When he goes into business it is, or ought to be, our duty to see that the office-building, store or factory is built, ventilated and heated aright; to see that the workers in all trades have plenty of fresh air to breathe, do not work in cramped positions, are not allowed consumptive fellow-workers, have good water to drink, have decent privies or water-closets, have time to eat their midday meals and not bolt them as some ravenous beast.—White in *Wis. Med. Jour.*