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Recent Experiences

in

Kidney Surgery and the Utility of Diagnostic Aids

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RECENT EXPERIENCES IN KIDNEY SURGERY AND THE UTILITY OF DIAGNOSTIC AIDS.*

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THAT the surgery of the kidney has kept pace with the rapid advance made in other branches of surgery is particularly recognized in the marked decrease of the rate of operative mortality in the last decade, as compared with that of the previous one.

One of the most valuable papers published during the period of 1900-1903 on renal surgery is that of Schmieden,¹ who collected records of 2,100 renal operations, including 1,118 nephrectomies, of which 108 were performed for lithiasis and 201 for tuberculosis. This author states that the former mortality of this operation was 33.3 per cent and that it has now been reduced one-half—to 16.7 per cent.

Another German writer, Kümmell,² calls attention to the improved results after operation and their relation to improved diagnostic methods, and declares that, since the use of cryoscopy, radiography, and cystoscopy, the general mortality after nephrectomy has dropped to 4.8 per cent.

I have prepared reports of some personal cases of renal surgery, representing different conditions which call for operative interference; and report them, not because they carry particular weight in a statistical way—as their number is too few—but on account of the fact that each one emphasizes some special point of interest bearing upon the question of diagnosis or of operation.

Nor do they illustrate completeness of detail in the preliminary history or a systematic resort to all the valuable diagnostic aids which are at present at command. They are, therefore, in some instances incomplete; and attention is called to such defective features with the object of promoting systematic study and painstaking care in preliminary investigation as an aid to accurate diagnosis.

*Read by invitation before the SOCIETY OF THE ALUMNI OF BELLEVUE HOSPITAL.

¹*Deutsche Zeitschr. f. Chirurgie*, Volume LXII, 1902.

²*Arch. f. Klin. Chirurgie*, Volume LXXII, 1903.



These cases include one nephrectomy for multiple renal calculi; one nephrotomy for multiple calculi; two nephrotomies for pyelonephritis, followed by secondary nephrectomy; one nephrectomy for tuberculosis; two nephrectomies for rupture of the kidney.

The maladies, therefore, include renal lithiasis with pyelonephritis; pus kidney without stone; tuberculosis of the kidney, and trauma.

Doubtless, we must look to greater experience and improvement in operative technique for an explanation of the notable advancement in this branch of surgery; but, above all, is it referable to refinement of diagnosis. To this end we rely upon the urinary and *x*-ray laboratories and the perfection of instruments and their better manipulation in connection with cystoscopy and catheterism of the ureter.

In the days before the introduction of the *x*-ray and cystoscope, before the laboratory was considered such an important feature, surgeons depended upon the physical examination, a rather cursory examination of the urine, and the subjective symptoms of the patient. It is needless to say how misleading might be the results of any or all of these methods of diagnosis. One may find, upon looking over the earlier text-books, that some writers endeavored to determine the location of a lesion by examining the urine for such evidences as the presence or absence of acidity, the presence or absence of mucus, and with respect to its general appearance. While we may still gain a certain amount of presumptive knowledge from such gross signs as these, we more frequently find the fallacy of relying too greatly upon such evidence.

In the physical examination we are also prone to be misled. How often is it impossible to palpate a kidney, in spite of the existence of a well-defined surgical lesion such as pyelitis, pyelonephritis, or renal lithiasis, and how mystifying often are subjective symptoms when pain is not referred to the kidney in which the suspected lesion is located, or when there is an absence of pain prior to an operation which reveals a well-marked surgical lesion; or, finally, when the symptoms are all vesical in character while the lesion is renal!

With the present methods of diagnosis, we have attained that degree of precision to which surgical advance in other departments is persistently tending; so that, today, we aim not only to determine the presence or absence of a lesion in the kidney; but, before operating on one kidney, we are enabled to find out the condition and functional activity of the one on the opposite side. The deep chagrin which must necessarily result from removing an only kidney need never occur with the present means of diagnosis.

In investigating a given case of suspected kidney lesion, we begin by eliciting a careful history of the case, the important features of which are the existence of pain, its character and duration, its loca-

tion and intensity and whether it is paroxysmal or persistent. Palpation further determines the location of the painful area and the presence of tumor or other abnormal condition of the region examined. Laboratory examination of the urine will reveal the presence of such abnormal constituents as pus, blood, bacteria and crystalline deposits, determine the daily output of solid constituents, which denotes the functional activity of the kidneys, and, by the aid of the microscope, recognize such other abnormal factors as are suggestive of kidney disease. When, by means of segregation or ureteral catheterism, the urine of each kidney is obtained separately, a comparative analysis may localize the lesion in one kidney and denote the functional activity of the other. Cystoscopic examination of the bladder further aids the diagnostic investigation, either by inspection of the ureteric orifices or by ureteral catheterism. Cystoscopy and careful observation of the ureteric orifices will often afford sufficient information to decide the question of operation when it is clearly observed that the urinary jet from one side is plainly bloody or purulent while that of the other is devoid of such appearance and when the other resources of diagnosis give sufficient support to the cystoscopic picture.

Indiscriminate practice of ureteral catheterism is not to be favored; although the important question of the functioning power of the second kidney when investigated by the application of cryoscopy is useful only when employed in connection with the separate urines from the two kidneys. Casper and Richter³ seem to have systematized a plan which they have carried out in a large number of cases for the purpose of obtaining definite knowledge previous to operation. This plan consists in obtaining the urine separately from each kidney after the administration of phloridzin when, by determining the cryoscopic point and relative activity of sugar elimination, the functioning power of each kidney is revealed.

These authors record a large number of cases to support their claim for the value of this method.

Of eighty-eight operations—seventy-six nephrectomies and twelve nephrotomies—performed after diagnosis by Casper and Richter's method, there was not a single death from anuria or renal insufficiency. Nine cases are cited, in which, while the operation ended fatally, the diagnosis as to the good and sufficient state of the second kidney was borne out by autopsy; and furthermore, in three other cases, the diagnosis of an incompetent second kidney was also borne out by autopsy.

The inestimable advantage of x-ray diagnosis in lithiasis has been demonstrated by the discovery of many renal and ureteral stones that otherwise would not have been known to exist and has taught the unreliability of the absence, and often of the presence, of pain in the kid-

³*Mittheil. aus den Grenzgebieten F. Med. u. d. Chir.*, Volume XI, 1903.

ney region. Improvement in the apparatuses, as well as in the use of them, has done much to render negative diagnosis more reliable; and in this particular we may hope for still greater advancement in the future.

The first two cases that I will report are nephrotomies for abscess of the kidney, followed by secondary nephrectomy.

Case I.—J. R., aged twenty-seven. Principal complaint, January 6, 1902, was severe pain in the right side. Urine exceedingly purulent. Temperature 104° Fahrenheit. Marked tenderness in the right kidney region. No tumor. History of a severe strain while carrying a heavy trunk four months previously, followed by hematuria, dysuria and frequent urination. Pain in side has persisted more or less ever since that time. No venereal history. Examination for tubercle negative.

Exploratory lumbar nephrotomy was performed. Several kidney abscesses involving the pelvis and the renal parenchyma were evacuated. There was temporary improvement following nephrotomy, but subsequent condition of both wound and patient was unsatisfactory. There was a continuous discharge of large quantities of pus, and the general condition was bad, as though from septic cause. Secondary nephrectomy was therefore performed two months after the nephrotomy. The patient made a slow recovery, but after leaving the hospital and taking an ocean trip, returned in robust health.

The specimen of this case is interesting in that it shows complete obliteration of the pelvis and occlusion of the ureter, which occurred after the primary operation (Figure I).

Case II.—The next case is similar in some respects to the previous one. It was referred as one of possible renal calculus, although there were ^{not} symptoms of colic. The urine contained a large quantity of pus of most foul and fetid character. A large and symmetrical tumor could be palpated in the left kidney region, near the surface. This was opened by complete incision, and a large quantity of pus of the same foul character as that contained in the urine was evacuated. There was no attempt to remove the kidney at this time.

Two months later a secondary nephrectomy was performed, on account of the unsatisfactory condition of the patient. The remainder of the damaged kidney was removed with difficulty on account of extensive adhesions. The wound healed slowly, but six months after the operation the patient presented himself in robust health.

Although in neither of the foregoing cases a complete preliminary investigation was made, further investigation would not have altered the course adopted; and resort to further diagnostic aids, such as the x-ray or cystoscope, would have delayed operation which was obviously a matter of immediate necessity. Nor was the question of the functional ability of the opposite kidney of prime importance, as the principal danger in both instances was progressively failing health on account of sepsis; and the chance of an insufficient second kidney was a lesser risk than that of general sepsis.

The next two cases are both examples of renal lithiasis, one operated upon by nephrotomy and the other by nephrectomy.

Case III.—W. L. B. This patient's principal complaint, October 20, 1904, was difficult urination, which was frequent and painful. He urinated every hour by day, and two or three times during the night. The urethral and vesical trouble dated back fifteen years, to a specific

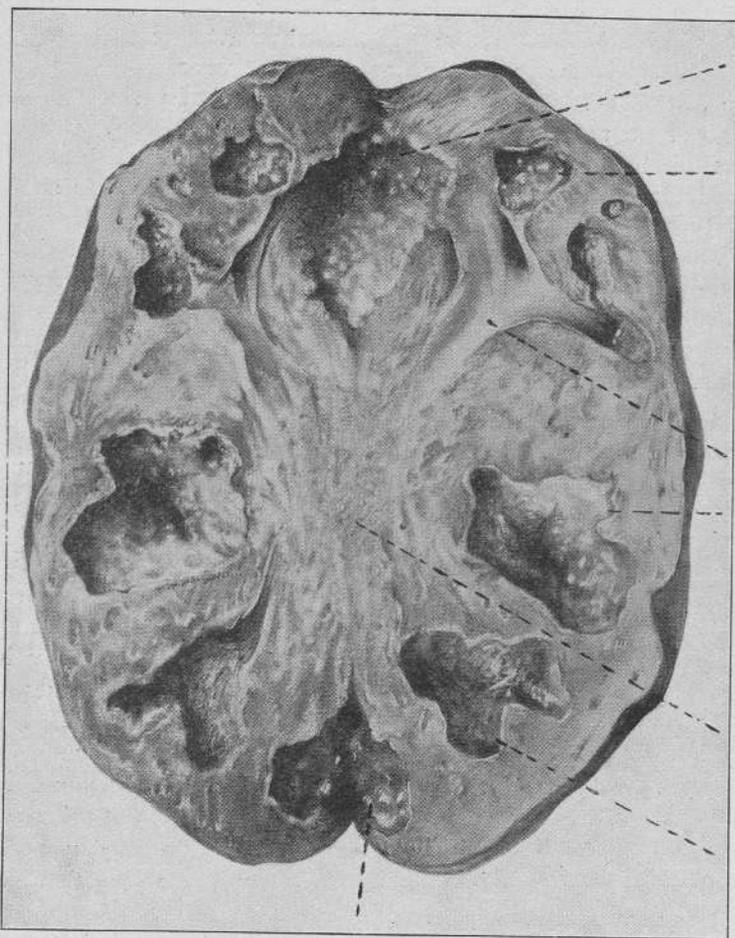


FIGURE I.—PYELONEPHRITIS WITH COMPLETE OBLITERATION OF THE PELVIS AND OCCLUSION OF THE URETER.

urethritis. Examination discovered a stricture at the bulbomembranous junction, barely admitting a filiform bougie. The urine was freely purulent, and formed a heavy, bulky deposit, of foul odor. There was a trace of albumin, some hyaline casts, and a normal urea output. These features practically cover the entire history of his case. There was no history of any pain, either dull, sharp or paroxysmal, in the region of the kidney. The patient was very fleshy; palpation was

difficult and revealed nothing. In fact, there was no reason to suspect anything connected with the kidney, as all the symptoms were urethral and vesical, and the history a very straight one, namely, acute specific urethritis, relapsing in type and protracted in duration; chronic urethrocystitis; gradual stenosis of the urethra at the bulbomembranous junction down to the size of a filiform bougie.

Perineal section was performed October 25, 1904. Stricture of the bulbomembranous urethra was incised to thirty-one French. The bladder was explored with the finger and the vesical neck was found to be distensible. In spite of the establishment of perineal drainage, there was no reduction of pus in the urine. Cystoscopy, which was impossible before, on account of the contracted urethra, is now performed through the perineal opening. The bladder vessels appeared to be turgescient and the urteric orifices swollen. The urinary stream from the right side was distinctly cloudy, so much so that the field of vision was quickly obscured, and the bladder had to be rewashed frequently.

On account of the large quantity of pus in the urine, and because the stream from the right kidney was plainly purulent, in the absence of symptoms of renal calculi, the history strongly suggested ascending infection of the kidney from a urethrocystitis.

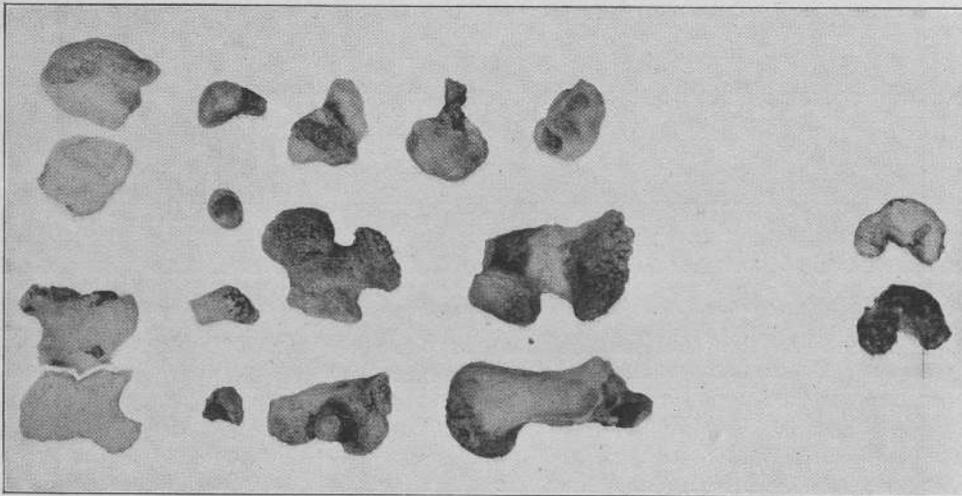
On November 29, 1904, the right kidney was explored through a lumbar incision and found to be much enlarged and very adherent to the surrounding tissues. Palpation recognized a mass of stones, and the cortex was incised and the stones removed, one by one, until twelve had been extracted. In examining the tissues around the ureters, above the bladder, two additional stones were found, which at first were thought to be in the ureter, but on passing a catheter through the pelvis to the bladder, it was discovered that these two stones were encapsulated in the soft tissues around the outside of the ureter (Figure II). On the anterior surface of the cortex there was an area of scar tissue that might have been the site through which these two migrating calculi were delivered. I know of no other explanation of this unusual occurrence. After removing all other calculi, the wound was closed with drainage. In the absence of definite knowledge of the other kidney nephrectomy was not considered.

The patient made a good recovery, leaving the hospital at the end of four weeks, and though the wound healed slowly, it eventually closed entirely, and he regained a robust condition of general health.

This case is particularly remarkable for the absence of symptoms referable to the kidney. It demonstrates how a patient may have not only one, but fourteen stones, of large size, and yet the situation be completely obscured by absence of pain in the kidney region. There is positively no doubt in the patient's mind about this absence of pain, as he has confidently repeated it on many occasions. The x-ray would, of course, have made a satisfactory diagnosis.

Case IV.—Mrs. A. H., aged forty. On March 24, 1903, this patient complained of dragging pain in the right infracostal region, which she associated with a movable body in the right abdomen. Pain varied with the appearance and disappearance of this movable body.

An operation had been performed ten years previously, when it was alleged that a small calculus was extracted from the right kidney. One or two paroxysmal attacks followed, but for seven or eight years pain had been only in connection with what was undoubtedly a nephroptosis of the right kidney. The right kidney was palpable and unusually movable. Urinary examination revealed abundance of pus and bacteria, one-sixth of one per cent albumin; urea output within the normal limit. The microscope showed cells from the renal pelvis. No



FROM PELVIS AND CALICES

FROM CELLULAR TISSUE OUTSIDE OF
PELVIS AND URETER

FIGURE II.—RENAL CALCULI. ($\frac{1}{2}$ actual size.)

cystoscopic examination was made at this time, and no *x*-ray pictures taken. The case was thought to be one of chronic pyelitis and nephroptosis.

On January 2, 1904, one year later, the patient returned in about the same general physical condition, presenting the same urinary features and the same symptoms. An *x*-ray picture was taken by Doctor Cole which revealed the presence of two stones, one in the pelvis and one in the calices (Figure III).

Operation was performed June 15, 1904. An oblique incision was made from the tip of the twelfth rib. The kidney was readily brought into the field and by palpation several stones were distinguished enclosed in what seemed to be little more than a sac (Figure IV). On account of the size of the stones and the apparent destruction of kidney tissue, nephrectomy was determined upon. Recovery was uneventful.

The patient sat up at the end of one week, was out of bed on the tenth day and left the hospital on the twelfth day.

She reported nine months after operation, greatly improved in general health; no more pain, urine clear and sparkling.



FIGURE III.—X-RAY OF KIDNEY BEFORE OPERATION,
SHOWING TWO STONES IN SITU (CASE IV).

FIGURE III.

This case demonstrates the importance of a complete investigation and the value of the *x*-ray, which should have been resorted to at an earlier date and would undoubtedly have led to an earlier operation.

The two foregoing cases represent two different operative courses—one conservative and the other radical—in nephrolithiasis

accompanied by pyelonephritis. In nephrolithiasis without pyelonephritis, there is little question that nephrotomy is the operation of choice. When, however, the kidney is the seat of suppuration, the question must then arise, What are the indications for extirpation of the organ, primarily or secondarily?

In the first two cases reported in this article—those of suppuration of the kidney *without* lithiasis—it was necessary to do secondary pyelotomy on account of continued destruction of the kidney substance by continuation of suppuration.

It is not always easy to determine the proper indications for a choice of operation. It is necessary to take into account the general condition of the kidney, the various complications, the integrity of the other kidney, and other considerations. Often after deciding on one

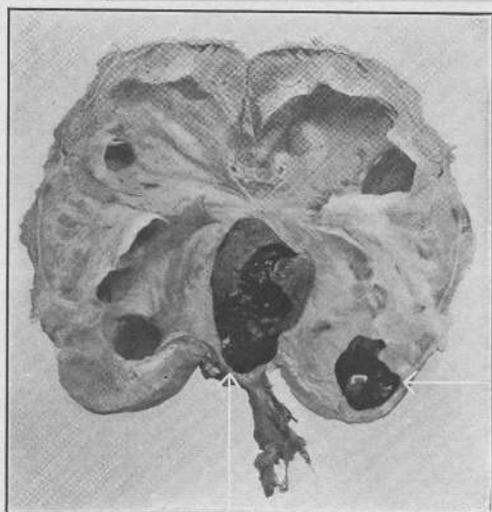


FIG. IV., CASE IV.—NEPHRECTOMY FOR PYELO NEPHRITIS, SHOWING TWO STONES IN SITU. (COMPARE WITH FIG. III.)

method, operation shows that we should have chosen the other. Results may be apparent only after a considerable interval.

Israel⁴ states that the aim of operation is to preserve the kidney when possible. He operated sixty-one times with nine deaths. Nephrectomy was performed in cases of badly infected kidney where conservatism was not practical. In fifteen such cases of nephrectomy for badly infected kidney he had only two deaths; and in thirteen conservative operations where the kidney had become badly infected he had five deaths. In twenty-nine simple nephrotomies—so-called "ideal" cases—he had one death. It thus appears that the infection plays an important rôle.

Kümmell⁵ makes it a rule to save the kidney if the ureter is permeable and there appears to be enough renal tissue left. We find, nevertheless, in his record of cases twenty-three infected cases of renal

⁴*Chirurg. Klinik f. Nierenkrankheiten*, 1901.

⁵*Archiv. f. Klin. Chirurgie*, Volume LXXII, 1903.

calculi—in ten of which he performed primary nephrectomy—and six nephrotomies requiring secondary nephrectomy, making sixteen nephrectomies out of twenty-three cases.

Nickolich,⁸ in giving his surgical experience with stones of the kidney from 1898 to 1902, reports twelve cases, eleven of which were septic and one aseptic. The aseptic case was treated by nephrotomy; three septic cases were treated in the same manner with two deaths. The remaining septic cases were treated by primary nephrectomy, with five recoveries and one secondary case, cured by secondary nephrotomy. In other words, out of eleven septic cases, there were six primary nephrectomies and one secondary nephrectomy with but one death; while three septic cases treated by nephrotomy resulted in two deaths.

Wagner⁷ advises restricting the indications for extirpation. He speaks for nephrotomy whether or not pyelo- or hydronephrosis coexists. Secondary nephrectomy he would use as a last resort.

Obalinsky,⁸ Rovsing⁹ and others are in favor of nephrotomy and Korte¹⁰ states that it not seldom happens that during a nephrotomy the kidney appears to have been transformed into a sac and the indication seems to be for extirpation; but, by leaving such cases, we are often astonished to note the return of the function to that organ.

Guyon and Albarran¹¹ also recommend conservatism, either nephrotomy or partial nephrectomy.

Zückerhandl¹² states that nephrectomy is indicated only when the kidney has become transformed into a fibrous mass and, when it has been shown that the function of the kidney is abolished.

Küster¹³ recommends total nephrectomy whenever a very large stone causes atrophy of the kidney, also in some consequences of calculi, such as incurable pyelitis and closure of the ureter, which is sometimes found after removal of the calculi. This secondary condition I have already referred to in connection with one of the cases reported of secondary nephrectomy.

Case V.—This case is an example of renal tuberculosis. Patient, age twenty-five, presented himself in December, 1904, and gave the following family history: Father died of Bright's disease and aunt died at the age of thirty of pulmonary tuberculosis. Patient considered herself well until six months previously, when she noticed a pain in the right kidney region, severe in character and running down the thigh as far as the knee. This pain was irregular in duration, lasting from two to three hours and disappearing every two or three days. During the attacks of pain urination became markedly frequent, and when pain subsided the frequency abated. Urination was accompanied by burn-

⁸*Arch. f. Klin. Chirurgie*, Volume LXIX, 1903.

⁷*Dzerné: Monatsb. d. Urologie*, Volume IX, 1904.

⁸*Ibid.*

⁹*Ibid.*

¹⁰*Ibid.*

¹¹*Ibid.*

¹²*Wiener Med. Pressc.* 1904.

¹³*Deutsche Chirurgie*. Volumes I, II and LIII.

ing in the region of the bladder. The patient grew progressively worse and in September her symptoms were so much aggravated that she often lost control of her urine by day and had constant nocturnal dribblings. The pain in the side became less frequent, remaining away for several days at a time.

In October, two months previously, she urinated every fifteen minutes by day and night; there was continual incontinence. She entered the hospital early in December when all her symptoms were referred to the bladder. Cystoscopic examination was made and revealed an ulcerated area surrounding the right ureteric orifice and another one in the upper quadrant. Even under general anesthesia the bladder would retain but four ounces. The urinary jet from the right side was turbid. The right ureter could be felt through the vagina thickened and enlarged; the kidney could not be palpated. No attempt was made to catheterize the ureter. A diagnosis of right tuberculosis of the kidney, with secondary implication of the bladder, was made, and operation suggested and refused. At the instance of her attending physician the patient was treated by bladder lavage for three weeks. At the end of this time she had an acute febrile attack preceded by a chill, and her general health had failed considerably.

Operation was again suggested and accepted, December 24, 1904. A longitudinal incision was made over the right kidney, which was exposed and examined. An abscess was found on the anterior surface of the kidney. The pelvis was opened and found full of pus and there were cheesy areas near the cortex. The ureter was much thickened and, on account of the tuberculous history and general condition of the patient, the kidney was completely removed. Previous to this, however, the patient was turned on the opposite side, a small exploratory opening made and the left kidney palpated. The organ was found to be *in situ* and of normal size and feel. This wound was rapidly sutured and the operation completed on the right side. The patient was transfused during the operation and rallied very well and her condition continued satisfactory thereafter.

The patient left the hospital at the end of five weeks very much improved in general health although the wound was not entirely healed. Since leaving the hospital her general condition has continued to improve and she has gained in weight. She has regained control of the vesical sphincter and urinates generally every hour, sometimes retaining the urine as long as two and a half hours. There is still some nocturnal incontinence.

The following is the urinary report of the urine secreted at the present time by the remaining kidney: Quantity in twenty-four hours, 1440 cubic centimeters; urea, 28.16 grammes; albumin, a trace; some pus and mucus; blood, a few cells; no tubercle bacilli; very few hyaline casts; bladder cells (Figure V).

Examination of the specimen shows an incision in the abscess of

the kidney on the anterior surface. The pelvis is markedly dilated running up in the calices. The microscopical examination yields the following report:

"A group of tubercles is present at the boundary zone and extends into the cortex. They have cheesy centres and some generally white cells. A very small abscess is also present. The tubercles and glomeruli in general show marked degeneration of their epithelial cells and some exudation in the lumen. Some hyaline casts were seen.

"The epithelium has entirely disappeared. The mucosa has formed and the mass of pus cells has disappeared. There are several tubercles with cheesy centres in the submucosa and some infiltration extends into the muscular coats."

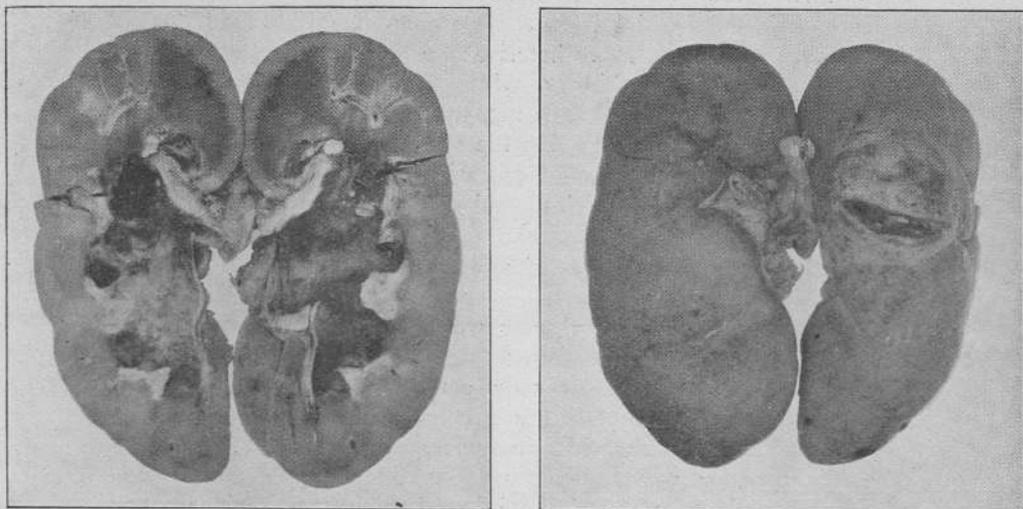


FIGURE V.—TUBERCULOUS PYELONEPHRITIS.

A diagnosis of tuberculous nephritis and suppuration involving the ureters and the pelvis of the kidney (pyelonephritis) was made.

The noteworthy features of this case are the predominant vesical symptoms that existed prior to operation and the notable relief of these symptoms after the main focus of tuberculosis had been removed. It is doubtful whether in this case any more thorough diagnostic investigation would be warranted, except an examination of the urine for tubercle, which was not obtained. An attempt to catheterize the ureter where there is a suspicion of tuberculous cystitis is doubtful wisdom; because the risk of carrying infection to an organ not involved must be feared. And there seems to be a general belief among authorities that primary tuberculosis of the bladder is seldom, if ever, encountered. It is also generally believed that, to obtain the highest degree of success, operation upon the kidney for tuberculosis of the urogenital tract should be radical. Therefore, in a case of extensive

tuberculosis of one kidney—especially with a pyogenic infection as in this case—complete removal of the kidney is the proper course, if the presence of the second kidney is established and that kidney is in fairly good condition.

The general belief of some of the important surgeons who have reported upon renal work and the operative mortality is as follows:

Israel¹⁴ reported thirty operations for tuberculosis, twenty-eight of which were nephrectomies with partial or total removal of ureter. There were eight operative deaths. About one-third of these cases were without bladder lesions. There were ten permanent recoveries.

Wyss¹⁵ reports thirty-five cases of renal tuberculosis at the Zürich Surgical Clinic, with twenty-one nephrectomies and two deaths.

Kümmell¹⁶ reports thirty-four cases of renal tuberculosis, of which thirty were treated by nephrectomy with twenty-seven recoveries and three deaths; seven patients were healthy two years later; four nephrotomies and pelvic operations, of which two died—a fifty per cent mortality.

Ramsey¹⁷ collected three hundred four operative cases of renal tuberculosis, of which there were one hundred ninety-one nephrectomies, with one hundred six recoveries. Of fifty-five nephrotomies, fifteen patients died within one month and twenty-two later—a mortality of over sixty-seven per cent.

Newman¹⁸ prefers nephrotomy early in the disease when localized to a small cavity and secondary nephrectomy as soon as nephrotomy is found to have been ineffective.

Leguen¹⁹ recommends nephrectomy in advancing renal tuberculosis if the opposite kidney is sound; and he calls attention to the fact noticed in the case I have already reported that vesical and pulmonary lesions do not contraindicate operation and that the former improve after operation and even—at times—the latter.

Simon²⁰ reports thirty-five cases of renal tuberculosis in the Heidelberg Clinic. There were seven nephrotomies with one permanent recovery and twenty-seven nephrectomies with thirteen survivals.

In a later contribution to the same journal (1904) Kümmell cites the figures of Gerson of Boston, which include one hundred ninety-four personal and two hundred one operations reported from Gangs. The total mortality was 29.4 per cent. Kümmell does not recognize such a condition as ascending tuberculosis of the kidney.

My last cases, Numbers VI and VII, are cases of subcutaneous injury to the kidney producing rupture.

Case VI.—C. W. B., age forty-five, presented himself January 17, 1905. Immediately preceding admission to the hospital, patient was

¹⁴*Chirurg. Klinik f. Nierenkrankheiten*, 1901.

¹⁵*Beiträge z. Klin. Chirurgie*, Volume XXXII, Number I.

¹⁶*Arch. f. Klin. Chirurgie*, Volume LXXII, 1903.

¹⁷*Annals of Surgery*, Volume XXXII, 1900.

¹⁸*London Lancet*, Volume I, 1900.

¹⁹*Annal. d. Mal. d. Org. Gen.-Urin.*, Volume XIX, 1901.

²⁰*Beitr. z. Klin. Chirurg.*, Volume XXX, 1901.

thrown from the seat of a baggage truck and was struck by the front wheel on the right side between the pelvis and ribs. He was not completely run over by the wheel and was not unconscious after the accident. Following the accident he had severe nausea and was dazed and complained of severe pain in his right side.

On admission to the hospital the general condition was good; no marked distention of the abdomen. There was rigidity of the right rectus muscle and a relatively greater resistance below the right costal arch; severe pain and tenderness in the same region, notably on deep pressure. A rounded mass is palpable in the kidney region. Severe pain on deep pressure over the right kidney both in front and behind. Urine bright red and cloudy; no sediment. Specific gravity 1010; albumin two per cent and, by the microscope, red blood corpuscles in abundance. Leucocytes, 14000. The patient remained in the hospital under close observation.

On January 22, five days after the injury, the urine continued to show an abundance of blood cells, many leucocytes and epithelium from the kidney.

The enlargement over the right kidney continued and the resistance became more marked. The patient's general condition showed evidence of failure.

Exploratory nephrotomy was performed January 27. A vertical incision was made in the left flank. After separating the perirenal fat, a large tumor the size of a child's head was reached. When this was incised it was found to contain the kidney and abundant blood clots. After removal of a free blood clot the hemorrhage became tremendously profuse. The kidney was quickly examined and found to be completely ruptured. A pedicle clamp was placed upon the renal veins; the ureter was ligated separately and then the blood vessels, after which the kidney was rapidly removed. The patient made a rapid and uninterrupted recovery (Figure VI).

Examination of this specimen shows a complete rupture of the kidney almost into two halves, and a number of areas of acute suppurations. Examination of the urine after operation shows that the functioning power of the remaining kidney is adequate. Patient was out of bed in two weeks, and out of the hospital one month after operation.

Case VII.—B. J. M., age twenty-five, entered the hospital January 25, 1905, suffering from rupture of kidney. Just previous to admission, while attending a fire, he was struck by a falling wall and rendered unconscious. When brought to the hospital he complained of considerable nausea but did not vomit. The pulse was rapid but regular; respiration shallow but otherwise negative; abdominal wall was rigid, more markedly over the right side. There was tenderness over the right kidney—front and back—and bimanual palpation recognized a large mass in the right kidney region. Some tenderness on the left side. Examination of urine showed the presence of blood.

Leucocytes, 15000. Blood in the urine continued to appear without cessation and the patient's condition showed marked failure.

On January 28, examination of the urine showed a diminished amount of blood, numerous hyaline, epithelial and granular casts, denoting secondary changes in one or both kidneys.

Exploratory nephrotomy was performed January 28. A vertical incision was made over the right flank. A large quantity of blood clot was found surrounding the kidney. The kidney was examined and found to be ruptured through the pelvis, including one of the veins. Further examination showed areas of secondary changes in the organ, and it was determined to completely remove it. This was accomplished after separately ligating ureter and vessels.

The patient was out of bed in two weeks after the operation and left the hospital about four weeks after the operation.

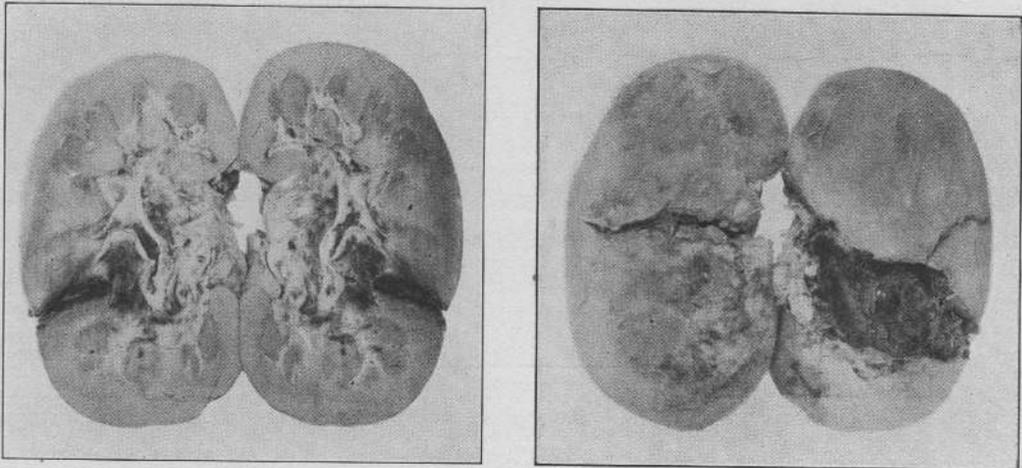


FIGURE VI.— TRAUMATIC RUPTURE OF KIDNEY.

Examination of the specimen shows a zigzag tear running into the pelvis through the kidney substances. The upper area reaches almost to the outer border. On the inside of the specimen are seen hemorrhagic areas, and in the cortex are some secondary changes necrotic in nature (Figure VII).

Microscopic examination by Doctor Sondern yields the following report: In the cortex, the capsules of Bowman are not thickened; but their lining epithelial cells are undergoing albuminous degeneration and are peeling off in places. The capillary tufts are congested, but nowhere compressed. The epithelium lining the cortical tubules is very markedly degenerated, swollen and peeling; so that in many cases it lies in the tubule lumen like a cast. Between and around the tubules and Bowman's capsules is a diffuse infiltration with polymorphonuclear round cells, especially marked near the capillaries around the convoluted tubes. In the medulla, many tubules contain cells and

granular debris; others contain hyaline casts, and still others red blood cells. Large areas have lost their staining power and have been converted into a more or less necrotic mass. The connective tissue between the tubules is edematous and sometimes diffusely infiltrated with pus cells, but nowhere thickened with new connective-tissue cells or fibres. The blood-vessel walls are not thickened. Wherever the tubule walls exist Bowman's capsules are thicker than normal; this is due to purulent infiltration and not to connective-tissue increase. A mass of blood and fibrin is present in the pelvis of the kidney. *Diagnosis:* Acute, diffuse, suppurative nephritis.

In both of these cases of rupture a radical operation was performed; in one on account of the very extensive laceration of the

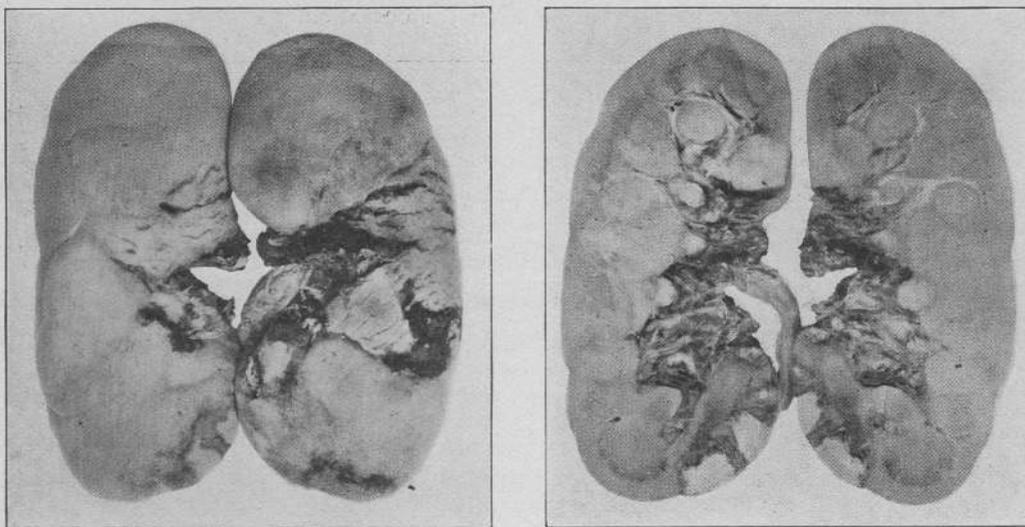


FIGURE VII.—TRAUMATIC RUPTURE OF KIDNEY.

organ and the continuation of the hemorrhage, and in the other because, while the laceration was not so extensive, there was evidence of beginning suppuration. It is possible that a tamponage and drainage operation in this case might have produced an efficient result; but the patient's general condition was so poor that it was deemed expedient to do a radical operation in order to render the postoperative period of convalescence as rapid as possible.

The consensus of opinion of writers and surgeons seems to favor the conservative treatment of traumatism of the kidney. Brewer favors exploratory nephrotomy in all cases of severe contusion of the flank with hematuria. He reports six cases of kidney injury in which this course was followed. Four of the cases were treated by exploration only, and were sutured, tamponed and drained. The other two cases were treated by nephrectomy; one primarily, on account of the

extent of the rupture; and the other secondarily on account of infection. Both of these latter cases recovered. One of the exploratory cases died, his condition appearing most hopeless at the time of operation.

Frisch and Zückerhand²¹ recommend purely symptomatic treatment in uncomplicated, mild and moderately severe cases of subcutaneous injury to the kidney; in profuse hematuria and extensive perirenal bleeding, immediate operation. They state that in theory the rational treatment is immediate extirpation of the diseased kidney by the lumbar route; but that it is extremely difficult to fix the danger limit, as spontaneous recovery has occurred after severe repeated hemorrhage with collapse.

Israel, in one of his cases of injury to the kidney, which was treated conservatively, found operation was necessitated later on account of hematogenous infection.

In Wagner's résumé of literature relating to the kidney, Schmidt²² reports a series of fifty-five subcutaneous injuries to the kidney in the Prussian army. There were fifty contusions, all of which ended in recovery, and five lacerations or ruptures, all of which ended fatally.

Küster, in giving the indications for nephrectomy, in his "Treatise on Surgical Infections of the Kidney,"²³ says that in subcutaneous injury, nephrectomy should be performed when the kidney is completely crushed, partial nephrectomy when only partially crushed, and nephrectomy in very severe injury involving the ureter; nephrectomy whenever a crushed kidney begins to suppurate.

As a result of my study of the features of these personal cases just related, and an examination of the general literature on the subjects involved, certain deductions and general conclusions seem to me to be justified and are submitted for your consideration and discussion.

(1) In profuse suppuration of the kidney, or multiple abscess of either kidney, there is a question whether nephrotomy or nephrectomy should be primarily resorted to—a question that can only be properly decided upon the merits of each case involved.

(2) There is no doubt that a very small remnant of kidney structure may perform a certain amount of renal function; and primary nephrotomy and drainage will often give time to decide this question more satisfactorily; and some patients may sustain a secondary better than a primary nephrectomy.

(3) General systemic infection may be considered an indication for both primary and secondary nephrectomy.

(4) As to lithiasis: The same rules may be applied in the treatment of the kidney itself as are employed in suppuration with renal calculi.

(5) There is no question that nephrotomy is the operation indicated in aseptic lithiasis.

²¹"Handbuch f. Urologie," 1904.

²²*Deutsch. f. Militäer-Ärztl. Zeitschrift*, Volume XXXI, 1902.

²³*Deutsch. Chirurgie*, Volume A and B.

(6) As to tuberculosis of the kidney: Even when there is a vesical and pulmonary involvement, the only resort of reasonable promise is nephrectomy when the integrity of the opposite kidney is established.

(7) Generally speaking, in urogenital tuberculosis, removal of the primary focus, which is frequently in the kidney, is likely to exercise an inhibitory influence upon the distal implication—as, for instance, vesical involvement.

(8) In subcutaneous injury to the kidney, where there is evidence of a perirenal tumor with hematuria, immediate exploratory incision should be employed and, when possible, suture and tamponade should be resorted to.

(9) Where the vessels or ureter have been ruptured and the laceration of the kidney is extensive, or where the injuries are complicated by beginning or progressed suppuration, total nephrectomy may be necessary.

(10) Conservative operation is favored by a majority of authors and symptomatic treatment is considered effective in mild cases.

(11) A safe rule is to resort to exploratory incision in all doubtful cases and to perform extirpation only when necessary.

(12) Above all, too much stress cannot be laid upon the importance of the refinement of diagnosis and the advantage of having recourse to the most improved methods of investigation.

(13) The great and progressive reduction of mortality is attributable to diagnostic improvement. Marked differences in mortality between different operators may be explainable by the failure to employ the latest diagnostic resources.

109 EAST THIRTY-FOURTH STREET.



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ERRATA.

- On page 3: Second line from bottom—read “often” instead of “offen.”
- On page 6: First line of second paragraph—omit comma after word “urine.”
- On page 17: First line of fifth paragraph—read “herein” instead of “just”; second line of ninth paragraph—read “without” instead of “with”; last line of page—read “*Chirurgie*” instead of “*Cuirurgie*.”



