the latter, because in several of these cases the amount of acid present in the gastric contents was sufficient to make digestion possible had there been any proteolytic ferment. The method, unfortunately, does not seem to be of value in distinguishing between carcinoma of the stomach and non-malignant achylia gastrica, although our investigations are still too few to enable us to speak with any certainty on this point. It does yield, however, a very distinct therapeutic indication, that is, that in cases of achylia gastrica the HCl should be administered *before*, and not after, meals. It should also be administered in sufficient strength and bulk to insure active stimulation of the gastric mucous membrane. Of three cases of achylia, all of which have received it in this manner, two have been greatly benefited; the third had been brought in a fairly good condition by several years' treatment before it was employed.

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ACUTE UNILATERAL SEPTIC PYELONEPHRITIS.

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DURING the past seven or eight years, surgeons have been greatly interested in a class of cases which had been previously regarded as beyond the scope of operative treatment. Up to 1899 one finds a few scattered reports of cases of acute unilateral pyelonephritis of the suppurative type which were operated upon. This condition was known as "surgical kidney" by our medical forefathers, because

it so frequently followed operations or manipulations upon the urethra or the bladder, or was a result of infection of the viscera which could be almost invariably found upon the autopsy table. With the introduction of aseptic methods in our operations upon the lower urinary passages the number of cases derived from this source diminished. It was observed, however, as a not infrequent complication of the cystitis accompanying calculus, enlarged prostate, and gonorrhea, although even at this time it was thought to be so uniformly bilateral that any operative relief for its symptoms was contraindicated.

Gradually the attention of the profession was drawn to the fact that acute symptoms of a septic character accompanied by localized tenderness, pain, and often palpable enlargement of the kidney, were due not only to infection ascending from the lower urinary passages, but that there were many cases which could not be thus explained. It was found that the organisms in the remaining cases must undoubtedly have been carried to the kidney through the circulation as metastases from distant foci of suppuration. The discovery thus was made and confirmed by a large number of surgeons that these septic lesions of the kidney, whether urogenous or hematogenous, were not only unilateral in the early stages, but that the cases with the severest septic symptoms yielded promptly to nephrotomy or nephrectomy.

One of the earliest writers to call attention to these unilateral septic renal conditions was Goodhart, in 1868. He found¹ at 130 autopsies upon cases of "surgical kidney" that the lesion was present upon one side in 14.5 per cent. In an additional 71 cases collected from the literature he found 12 (16 per cent.) unilateral. In 1883, Singer reported a case of unilateral renal suppuration immediately following typhoid fever. The kidney had been severely injured eighteen years before. One of the most interesting contributions to the literature of the subject is that of Robert F. Weir.² The case was one in which he performed nephrectomy in a young man, aged twenty-five years, who had a severe urethrocystitis three months previously. The chief symptoms were fever of a remittent type (to 105°) and chills. The colon bacillus was found in pure culture in the extirpated kidney.

In 1895, Woodward³ reported a case in which he had performed nephrectomy for a unilateral septic nephritis. The first case reported herewith was published in August, 1899.⁴ It is superfluous to mention in detail the articles that have been written since 1899. Excellent reviews of the entire subject have been published by Klink,⁵ in 1903, and by Wagner,⁶ in 1904. We now know that cases

¹ Guy's Hospital Reports, vol. xix.

² Medical Record, September 16, 1894.

³ Annals of Surgery, 1895.

⁴ Chicago Medical Recorder, August, 1899.

⁵ Centralblatt der Mittheilungen aus den Grenzgebieten der Medizin und Chirurgie, 1903.

⁶ Schmidt's Jahrbucher, 1904.

of acute unilateral pyelonephritis with severe septic symptoms have a definite etiology and pathology, and that they can be recognized and are amenable to surgical treatment.

ETIOLOGY. The causes are best divided into the two chief modes of infection, urogenous and hematogenous.

1. *Urogenous Infection.* The various modes of origin of this form are:

(a) Cystitis. This is one of the most frequent causes of an ascending infection. The cystitis is usually of a chronic type and associated with retention of urine. For this reason the renal condition is more frequent in males, since the causes leading to stagnation and retention of urine are more frequent, owing to the presence of an enlarged prostate or of a stricture of the urethra. The acute pyelonephritis of pregnancy and of the puerperium, which is often so difficult to recognize, can be explained upon the basis of the cystitis frequently present and so greatly favored by the stagnation incident to these conditions.

(b) Hydronephrosis and nephrolithiasis. Both of these renal conditions favor infection of the parenchyma, through the obstruction to the outflow of urine which they cause, added to the microorganisms so often present in these conditions.

(c) Unclean ureteral catheterization.

(d) Ureteral fistulæ. Here there is no resistance to the transmission of infection to the kidney.

2. *Hematogenous Infection.* This arises as follows:

(a) As a complication of subcutaneous injury of the kidney. Israel called attention to this form of acute pyelonephritis in his text-book, in 1901, and George E. Brewer⁷ has recently contributed some valuable clinical and experimental observations, eleven cases of his own, and two of Joseph A. Blake, of acute pyelonephritis. Eleven of these occurred in women and two in men. There was a distinct history of injury in two and previous disease in one. In five cases there was recent history of some febrile disorder. In order to confirm his view that an injury to a kidney is frequently followed by acute unilateral septic infarcts he bruised the kidney and injected hypodermically varying amounts of cultures of organisms, such as *Staphylococcus pyogenes aureus*, *Streptococcus pyogenes*, *Bacillus coli communis*, *Bacillus typhosus*, and *Pneumococcus*. Of sixteen animals which, in addition to the inoculation, received an injury to one kidney, five showed no lesion, or only hyperemia and parenchymatous degeneration. Two of these animals died within twenty-four hours of acute septic intoxication. Of the remaining eleven, all developed distinct surgical lesions of the kidney. In eight the lesions were unilateral, and limited to the injured kidney. In three, the lesions were bilateral. In one of the bilateral cases the

⁷ Surgery, Gynecology, and Obstetrics, May, 1905.

lesions were practically equal in extent and in severity. In the other two, the lesions in the uninjured kidney were mild in character, and undoubtedly would have subsided under favorable conditions. The renal lesions produced by these experiments were practically identical with those observed in my clinical cases. They showed considerable variation in number, extent of renal destruction, and degree of resulting toxemia. While these experiments have not been sufficiently numerous nor varied to investigate all of the causes which might direct a given blood infection toward one kidney, they demonstrate in a very conclusive manner that injury to a single kidney, whether produced by trauma, the presence of a foreign body in the pelvis, or an acute obstruction of the ureter, certainly acts as a strong predisposing factor in the evolution of a surgical lesion of that organ.

(b) As a result of catarrhal conditions of the intestine or as a complication of stagnation of the fecal current. Baginsky and Heußner have called attention to the frequent occurrence of septic renal conditions due to the colon bacillus, as a metastasis of these organisms, following gastrointestinal disturbances in children.

(c) After the acute infectious diseases septic emboli are very likely to lodge in healthy and in hydronephrotic kidneys.

(d) As a metastasis from furuncles, tooth infection, or any form of peripheral suppuration. Hessert has recently reported a case of acute pyelonephritis following a carbuncle on the neck, and Israel has observed several such cases.

(e) As a metastasis from the lower urinary passages or from the opposite kidney in consequence of transmission of the organisms through the circulation, and not by means of an intervening ascending infection. This form is very prone to develop after urethral or vesical manipulation.

PATHOLOGY. The most satisfactory division of the various conditions in which the kidney is found either at autopsy or during life is that given by Israel.⁸

1. *Ascending Catarrhal Pyelonephritis.* In these cases the mucosa of the pelvis is swollen and there is marked catarrhal inflammation of the collecting tubules of the kidney.

2. *Multiple Miliary Foci of Suppuration.* This is the most frequent and typical form. The kidneys removed in both of my cases belong to this group. The small foci of suppuration are irregularly scattered through the entire kidney, the cortex being especially involved. The foci, as in my second case, may be almost exclusively confined to one pole of the kidney. The cortical foci project usually above the level of the surrounding parenchyma. They are usually arranged in groups, each abscess being surrounded by a zone of intense hyperemia. On section one sees many streaks of purulent softening extending from the hilum to the cortex and radiating in a fan-like manner from the pelvis.

⁸ Nierenchirurgie, 1901.

3. *Hyperacute Form.* The course of the disease is so rapid that there is no time for the formation of foci. Examination of such kidneys shows only most intense congestion. At times there are some ecchymoses and turbidity. The entire cut surface is œdematous.

4. *A Few Large Abscesses.* This form is rare.

5. *Gangrene of the Pelvis and Gangrenous Foci in the Parenchyma.* This variety is very rare and its etiology unknown, but it is probably hematogenous.

A perinephritic abscess may result from the second, fourth, and fifth forms.

The organisms which may produce this condition are the *Bacillus coli communis*, *Gonococcus*, *Staphylococcus aureus* and *albus*, and *Streptococcus pyogenes*. According to Rovsing any urine-decomposing organism can cause the disease. At times it may occur during the course of a chronic pyelitis of hematogenous origin, or as a complication of tuberculosis of the kidney as a mixed infection.

SYMPTOMS AND DIAGNOSIS. The symptoms vary according to the intensity of the infection. In general, one may speak of two classes of cases: The first class is the one in which the kidney is but little suspected to be the cause of the symptoms. In this variety the clinical picture is that of an acute, general septic intoxication. The principal symptoms are repeated chills, high temperature usually remittent, but sometimes continuous, rapid pulse, marked prostration, and nervous symptoms, such as restlessness, delirium, and stupor. There is usually marked leukocytosis. In all probability some cases which have been spoken of as cryptogenetic septicopyemia belong to this group, in which the general septic symptoms predominate. The local signs of a kidney infection are so slight that they are frequently overlooked, unless a very careful physical examination is made to exclude other causes of sepsis. These cases are often so acute in their onset (according to Brenner), and so rapidly progressive in their septic manifestations, that death may ensue before any renal or urinary changes show themselves. In the diagnosis the history of previous infection is of aid, as also that of some subcutaneous injury in the kidney region. The urine shows a few pus cells, or may contain nothing abnormal.

In the second class of cases the diagnosis is not so difficult, since the local signs predominate from the first and are accompanied by symptoms of septic intoxication. These local signs are: (a) Severe pain, most frequently located over the affected kidney. In the very acute cases this pain may not be so accurately localized, but referred only to the side of the abdomen corresponding to the affected kidney. When the right kidney is involved the differential diagnosis between this affection, appendicitis, gallstones, etc., is often very difficult. The onset is often as sudden as in any of the affections mentioned. (b) A second symptom of considerable importance

is marked tenderness on pressure in the costovertebral angle of the affected side. (c) A third valuable sign, well-marked in the second of my cases, is rigidity of the abdominal muscles in the neighborhood of the affected kidney. In some cases one can palpate the kidney as enlarged and extremely tender. This sign was of great value in my second case as a differential diagnostic sign serving to exclude other acute suppurative diseases of the right side of the abdomen. The urinary symptoms are decrease in quantity of urine and the presence of pus in variable quantity. The general symptoms are quite characteristic, and are similar to those observed in the class of cases in which the general septic symptoms predominate over the local inflammatory ones. Chills occur at frequent but irregular intervals and are followed by a marked elevation of temperature. The fever is usually of a remittent type, but may be continuous.

The most characteristic symptoms are: Location of the pain, tenderness, and rigidity over the affected kidney, accompanied by pyuria, chills, fever, and remittent temperature. Such a unilateral septic process may occur in a kidney which has been the seat of a previous chronic condition, such as calculus or tuberculous pyelitis. One of the local signs to be especially mentioned is the presence of severe renal colics. These are due, as Israel has shown, to the extreme congestion of the kidney. The colics may simulate stone to such an extent that they are accompanied by anuria. The differentiation can readily be made from the graver septic symptoms present in an acute unilateral septic nephritis. If such a septic process occurs in a displaced kidney the differential diagnosis is almost impossible.

The following two cases will serve to illustrate this form of acute unilateral septic nephritis:

CASE I.—Mrs. B., aged twenty-six years, was admitted to St. Luke's Hospital June 4, 1898, on account of laceration of the perineum, cystitis, and suspected renal calculus. She stated that since the birth of her child (seven months previously) she had suffered from severe pain on urination, accompanied by the passage of calculi varying in size from a pea to a bean. Before the expulsion of these she had sharp pains in the region of both kidneys, with tenesmus and the passage of large clots of blood. There was intense burning and smarting on urination. The urine upon admission contained triple phosphates, pus, red blood corpuscles, and considerable albumin.

An exploratory nephrotomy performed in July, 1898, by Dr. W. H. Allport, resulted negatively. A little later the urethra was dilated, some small whitish particles were removed, and was followed by irrigation with silver nitrate. She was discharged on August 16, 1898, after her temperature had been normal for some time. The urine at this time contained a few pus cells; she still had incontinence, and occasionally passed pinhead-sized phosphatic calculi.

On August 24, 1898, she was readmitted, with a temperature of

105.4° F., and a pulse of 140. She stated that for the preceding four days she had suffered from excruciating pains in the region of the left kidney, which radiated down the ureter to the bladder and were accompanied by repeated chills and high fever. Examination revealed marked tenderness over the left kidney and very marked muscular rigidity in its vicinity. The urine contained a large number of pus corpuscles.

The diagnosis being made of pyonephrosis with probable renal calculus, I immediately performed an exploratory operation. The kidney was found adherent and greatly enlarged. Upon being brought into the abdominal wound, the many groups of miliary abscesses with hyperemic zones so characteristic of an acute pyelonephritis were seen scattered diffusely over the cortex. Nephrectomy was performed. Upon the following day the patient's temperature rose to 105°, and the urine was much clearer. The amount passed in twenty-four hours was 800 c.c. Upon the third day after operation she was removed to the isolated ward, on account of a faucial diphtheria; here she received 2000 units of antitoxin.

On her return to the surgical ward, on September 24, 1898, her temperature was normal; in twenty-four hours she passed 660 c.c. of urine containing pus and a few granular casts. The extirpated kidney showed many groups of miliary abscesses in the cortex, especially just beneath the capsule. On section yellowish streaks of purulent softening were seen extending from the apices of the pyramids toward the capsule. There were no calculi, but the pelvis was deeply congested and filled with pus.

The patient was operated upon after this twice during the next year: once for an ovarian cyst, and a second time for chronic recurring appendicitis. The latter operation was performed by myself. At this time (August, 1899), one year after the nephrectomy, her urine contained no pus; she suffered from incontinence during the day, but not at night. She passed from 46 to 48 ounces in twenty-four hours, and had gained twenty-two pounds in weight.

CASE II.—Fred J. was seen in consultation with Dr. H. L. Baker, on October 27, 1905. He stated that about eighteen months previously he had been struck in the back with some degree of violence by a street car. He never felt well since that time, but had no definite symptoms, until about six weeks before my first seeing him. During this period he had severe pain in the back, fever, and chills. The cycles of recurrent chills and fever would last about a week; that is, he would have chills for a day, then high temperature, which gradually diminished, until at the end of four or five days he felt much improved. Then the chills and fever recurred. While in the hospital his temperature dropped from 104° to normal in three days. After being normal for twenty-four hours it suddenly rose to 104° again. There was marked rigidity of the abdominal muscles over the right kidney. The latter could be felt as enlarged and

very tender on bimanual examination. The urine contained a large amount of pus and was alkaline in reaction.

The patient refused operation until November 2, 1905, when the temperature after having been normal for twenty-four hours rose to 104° and was again accompanied by very rapid pulse and great prostration. I made an incision over the right lumbar region parallel to the last rib. On exposing the kidney many adhesions were found. The organ itself was brought to the surface. The cortex of the upper half was seen to be studded with a very large number of miliary abscesses arranged in groups with a hyperemic zone. A few were also seen over the lower half. Nephrectomy was done.

The temperature became normal after the operation. The urine for first few days contained small amount of pus. Since then it has been clear. He began to resume active work as a painter about six weeks after the operation. He has gained thirty pounds in weight.

I believe that in the first case the infection was urogenous from a marked cystitis. In the second case a possible injury to the kidney preceded the urinary symptoms by over a year. There were no signs of cystitis before or after the operation, so that the infection may have been hematogenous.

TREATMENT. There are three distinct methods of treatment. The first is the medical, which may succeed in the milder cases: the administration of urinary antiseptics and the ingestion of large quantities of bland fluids, such as milk, water, etc. The temperature should be controlled, as far as possible, by hydrotherapeutic methods. The bladder should be irrigated at regular intervals with weak nitrate of silver. Ureteral catheterization should never be used because of the danger of infection.

The other two methods of treatment are of an operative nature and differ only in degree. The first is nephrotomy, and consists of exposing the kidney and opening the multiple abscesses with or without stripping off the capsule. There are many surgeons (like Israel, Brewer, Johnson, etc.) who claim that this method does not give as good results as nephrectomy. Some of the more radical advocates of nephrotomy even recommend the excision of the affected areas, if this be possible, in order to conserve as much of the kidney as can be saved. Nephrectomy has almost as many supporters as the more conservative operation. Johnson cured only one of seven patients by nephrotomy, the remainder being discharged with fistulæ. In a later series of five cases he performed nephrectomy three times successfully.

Which one of these two operations is to be performed in an individual case rests to a great extent on the experience of the operator. In my own two cases nephrectomy resulted favorably in both, but I believe that in any future case I should be inclined to give nephrotomy a trial, especially if the disease was not far advanced and the areas of suppuration were miliary in size or only slightly larger.

I have been able to collect from the literature 34 cases in which nephrotomy was performed with 28 recoveries (82 per cent.), and 27 cases of nephrectomy with 25 recoveries (92 per cent.). It is, of course, unfair to draw conclusions from these statistics, since the cases vary greatly in severity. If the condition occurs during pregnancy conservative operation is indicated. If the condition is a part of a general pyemia extirpation of the kidney is out of the question.

GASTRIC ULCER IN CHILDHOOD.

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THE following case of hematemesis occurring in a child of eight years has been of considerable interest, on account of its apparent rarity, and caused me to study the subject of gastric ulcer in childhood:

B. L., white, female, has been attending school, and living under excellent conditions of sanitation and nutrition. The family history is negative. The child was breast-fed, and well nourished in infancy. At the age of two years she had a rather severe attack of acute gastritis attended with fever and persistent vomiting for several days. She also had German measles, but otherwise none of the infectious diseases of childhood. For several years she has been "taking cold" easily, having several attacks of bronchitis every winter.

Her present trouble is of about ten weeks' duration. She suffers with repeated attacks of pain in the epigastric region. The pain occurs in paroxysms both before and after meals. Often it begins before meals, is relieved for a short time by taking food, and then returns sharper than before. It persists then a varying time, from one to three hours. At times it comes on in the midst of a meal. Sometimes it disappears quite suddenly. While in my office on the first examination she suddenly became nauseated and vomited, without apparent effort, food streaked with blood. The vomited matter gave the reaction for free hydrochloric acid. One week later, during an attack of pain, she again became nauseated and vomited about an ounce of bright blood.

The patient is rather frail and pallid. She weighs 42 pounds. The lungs and heart are normal. There is marked tenderness to pressure in the epigastrium. The stomach area is normal on percussion. The liver dulness is normal. The spleen is not palpable. There is no tenderness over the rest of the abdomen.