

	Chronic cystitis.	Catarrhal pyelo-nephritis.	Suppurative pyelo-nephritis.	Pyonephrosis.	Kidney abscess.
Appearance of urine	Bladder pus.	Bacteriuria.	Renal pus.	Usually no pus.	No pus.
Reaction of urine ..	Usually alkaline.	Acid.	Usually acid.
Albumin	From pus or blood.	Present.	Present.	Usually.	Usually.
Casts.....	Absent.	Present.	Present.	Usually.	Usually.
Bladder symptoms..	Present.	Absent.	Sometimes.	Sometimes.
Renal symptoms...	Absent.	Usually none.	Pain, tenderness, tumour.	Large tumour, pain, tenderness.	Indefinite.
Urinary toxemia...	Absent.	In later stages.	Present.	Present.
Urinary septicemia.	Absent.	Absent, unless acute.	Present.	Present.	Present.

PROGNOSIS

As to prognosis, the various surgical inflammations of the kidney have been dealt with separately. Dealing with them collectively we may say that the prognosis depends upon the damage done to the kidney tissue (*a*) by the bacterial inflammation, and (*b*) by the interstitial nephritis. When an acute catarrhal pyelo-nephritis is cured, the casts and albumin disappear from the urine after a few months, and no sign of the inflammation remains. With chronic catarrhal pyelo-nephritis the case is different. While this inflammation does not directly threaten life, and while the bacteria may usually be driven from the kidney by a prolonged course of suitable treatment, the interstitial sclerosis remains, and the kidneys never return to a normal state. Whether this sclerosis continues stationary after its bacterial cause has been eliminated, or whether it progresses slowly after the fashion of the medical chronic interstitial nephritis, I cannot say.

When there is actual suppuration in the kidney substance, whether the condition be a suppurating pyelo-nephritis, a pyonephrosis, or an abscess of the kidney substance, the prospect is still less encouraging. The patient often escapes with his life, and the suppuration may be controlled by appropriate measures, but in many instances the resultant catarrhal pyelo-nephritis cannot be entirely conquered; and even if it is, the kidney is always left badly scarred. But one of the most striking features of renal pathology is compensatory hypertrophy of the kidney. Not only will one kidney do the work of two after nephrectomy, but the merest shell of a kidney, the dense fibrous sac of a pyonephrosis in which the naked eye de-

fects no secreting structure whatever, is still a functioning organ. Its power of excreting solids may be much diminished, but its capacity for transmitting water is practically unimpaired; and it is still a useful organ, one that should be spared to the patient if the inflammation in it can be cured.

The prognosis as regards life and death depends chiefly upon the treatment.

TREATMENT

Prophylaxis.—All ascending infection of the kidney may be prevented by prompt and efficient treatment of the cause of retention, be it stricture, prostate, or what not. Descending infections do not so readily lend themselves to prophylaxis; yet it is often possible to nip acute puerperal or typhoid pyelo-nephritis in the bud, if the possibility of this renal infection is borne in mind. The operative prevention of calculous pyelo-nephritis does not concern us here.

The condition of the bowels is of the utmost importance in the prevention of infection of the kidneys. The bacillus coli is the infective agent in almost every case of descending renal infection. This bacillus reaches the general circulation from the intestine only when the bowels are constipated or otherwise diseased, and is excreted from the general circulation through the kidneys. Hence as long as the regular daily movements of the bowels are uninterrupted there appears to be little danger of spontaneous infection. It is intestinal stagnation that applies the spark.

Hence renal inflammations are preventable in two ways: The retention that prepares the kidney for infection and the intestinal stagnation that supplies the infectious agent may both be prevented.

Curative Treatment.—The inflamed kidney may be considered an abscess cavity. What it requires is drainage and irrigation with an antiseptic fluid.

Drainage.—The kidney affected by *catarrhal pyelo-nephritis* is habitually normal in shape and size. There is no abscess cavity in its parenchyma, no pouch in its pelvis; yet as a rule it is not properly drained. The outflow of urine is impeded by stricture, hypertrophied prostate, pelvic tumour, peritoneal adhesions, or pregnant uterus. In order to establish proper drainage this retention, whatever its nature, must be relieved. Without this it is quite impossible to relieve the renal inflammation (p. 380).

Suppurative pyelo-nephritis (not calculous or tubercular) may sometimes be relieved by the same indirect method of drainage that applies to catarrhal inflammations. Thus a surgical kidney due to cystitis from prostatic retention may usually be cured by draining

the bladder. In such cases the restored equilibrium of urinary pressure permits the pus to drain freely. But often enough vesical drainage does not suffice. The pelvis is so pouched or the renal substance so riddled with abscesses that the kidney itself must be drained by nephrotomy. If the kidney is palpably dilated at the time cystotomy is performed, it is proper forthwith to establish drainage through the loin. The patient's condition may render the procedure a desperate one, yet the alternative of leaving a poorly drained abscess is even more desperate than a rapid nephrotomy.

In other cases the cystotomy does not relieve the patient. In spite of efficient bladder drainage the sepsis continues, the patient does not gain in strength, perhaps one or both kidneys become tender or enlarged. The proper treatment of such a case requires the ablest prognostic acumen. Nephrotomy may prove fatal. The patient may recover without it. When performed soon enough it will cure if it does not kill; when performed too late it can only kill, it cannot save. Yet who shall say too late! The best technical judgment and skill may err. One can only say that a septic patient is a better risk than a uremic one, and that proper drainage should at all risks be afforded before the kidneys give out. Perhaps in the future cryoscopy or the elimination tests will aid us to decide.

Nephrotomy is the Treatment for Pyonephrosis.—Cystotomy, ureterotomy, or some other operation may be required as well, for the urinary right of way must be cleared from top to bottom; but nephrotomy is the essence of a cure. The operation is not a severe one. Perhaps my experience has led me to be too optimistic; but certain it is that when death has followed nephrotomy at my hands, the cause has been urinary septicemia, which could be relieved by no means other than nephrotomy. Yet I have not escaped the accidents that befall other surgeons. I have opened the peritoneal cavity. I have encountered severe secondary hemorrhage. And still I assert confidently that properly performed nephrotomy is an operation simple for the surgeon, safe for the patient, and brilliant in its results.

The object of nephrotomy is drainage. The surgeon wishes to obtain (a) thorough drainage through the wound for a few weeks, and then (b) thorough drainage through the ureter. To get satisfactory wound drainage it is only necessary thoroughly to open up the suppurating foci and to drain from a dependent point (p. 640). But to establish drainage through the ureter is no such simple matter. In speaking of hydronephrosis some space was devoted to the consideration of operations for the relief of the various ureteral obstructions. Such operations are feasible in hydronephrosis, but

the suppurating kidney, whether dilated (pyonephrotic) or not, is so surrounded by dense adhesions as to make plastic procedures difficult or impossible. The patient is in no condition for a protracted operation; while the inner surface of the suppurating organ is often so subdivided, so pocketed that the establishment of permanent perfect drainage is impracticable. No two cases are alike. In one a small central abscess requires incision and drainage. In another the removal of a calculus effects a cure. A third requires some plastic work about the ureter. A fourth demands urethrotomy or prostaticotomy. A fifth calls for nephrectomy. A sixth is so debilitated that it is deemed unwise to attempt anything more than simple drainage: if lucky he will recover and his lumbar fistula will heal. If the lumbar fistula persists a secondary operation is called for.

One hears much discussion on the comparative merits of *nephrotomy and nephrectomy* in the treatment of suppurating kidney. Inasmuch as the question can never be decided one way or the other for all cases, the discussion will doubtless continue. But the essence of the matter is this: if adequate ureteral drainage can be established nephrotomy suffices. Nephrectomy is required when the kidney is so pouched that the urine and pus cannot be made to drain efficiently through the ureter, or when its suppuration will do the patient more harm than its secretion will do him good.

Nephrectomy may be primary or secondary. There are advantages on each side. For secondary nephrectomy it is claimed that it exposes the patient to a severe shock—which nephrectomy always does—only when he has been given the opportunity to rally from his septicemia by a palliative nephrotomy. On the other hand, it is urged that secondary nephrectomy, on account of the adhesions formed after nephrotomy, is far more difficult and dangerous than primary nephrectomy. Both contentions are just, and, in order to reconcile the opposing views, it has been suggested that secondary nephrectomy be performed after the patient has somewhat recovered from his sepsis, but before dense adhesions can form. So long as any mortality remains to either operation, there will be a difference of opinion in this matter. But it is generally conceded that:

1. If the patient is gravely septic or uremic, it is safest to perform rapid nephrotomy with no thought of the ultimate result.
2. If the general condition is good, every effort should be made to re-establish ureteral drainage, and the kidney should be removed only (a) when it is obvious that ureteral drainage can never be re-established, or (b) when the suppurating cavity is so large and the remaining renal tissue so slight that it does not appear possible for the cavity to close down without subjecting the patient to a pro-

longed course of suppuration, for which the possession of an extremely disabled kidney would never compensate.

3. If, for any reason, ureteral drainage is doubtful, the patient should be given the benefit of this doubt, and nephrectomy postponed until the persistent lumbar sinus has shown that the re-establishment of ureteral drainage is not to be expected.

4. Nephrectomy, primary or secondary, should not be thought of until it is proved that the opposite kidney is capable of supporting life.

Such are the general and more or less defined rules that must guide the surgeon. Their practical application, the technic, and the results of operation, are described in another chapter.

Abscess of the kidney requires nephrotomy or nephrectomy, if it is possible to save the patient by these means. When the renal lesion is only one phase of a pyemia, it is needless to add to the patient's discomfort by cutting holes in his back. Yet an acute case, especially if it occurs in a comparatively young person, may perhaps be saved from otherwise certain death by prompt nephrotomy.

Irrigation and Antisepsis.—This—the medical and palliative part of the treatment—is accorded a secondary place because, while it may be the only treatment required for a given case of surgical renal disease, yet the essence of all treatment must be drainage. Drainage without medicine may cure; medicine without drainage cannot cure. Drainage we must have, whether afforded by Nature or by the surgeon. Yet our medical treatment is most important. It is employed for three purposes:

1. To prevent infection. (*Cf.* Prophylaxis.)
2. To control inflammation when perfect drainage cannot be obtained, and
3. To cure inflammation.

The routine medical treatment is twofold: irrigation and antisepsis. The principles upon which this treatment is founded have been laid down in another chapter (p. 373).

Acute catarrhal pyelo-nephritis yields promptly to urotropin and diuresis. The administration of urotropin should be continued for several weeks after the bacteriuria has ceased. It may be necessary to increase the dose to 3 or 4 grammes a day, in order to conquer the bacteriuria, but as soon as this is controlled, it may be reduced to 1.5 grammes. Even when the higher doses are intolerable, I look for better results from a prolonged course of diuresis and urotropin, at the highest dose possible, than from salol or benzoic acid.

Chronic catarrhal pyelo-nephritis demands the same treatment. There is usually a prostatic retention to be corrected and constipa-

tion to be overcome. Urotropin and diuresis should be continued for months. There is no advantage in pushing them. If perfect drainage is not obtainable (because the patient will not submit to systematic catheterism or to operation) the medical treatment is still useful as a palliative, to prevent exacerbations of inflammation. Hygiene and climate are often very beneficial in these cases.

Suppurative pyelo-nephritis demands medical treatment chiefly for the urinary septicemia. Persons suffering from mild chronic suppuration in the kidneys are often unwilling or unable to undergo the operation required to establish perfect drainage. Moreover, it is just such cases that are least amenable to operation. There may be no very definite obstruction, but only a slight renal dilatation. I have cured such cases by nephrotomy; but I have cured them—or they have cured themselves—equally well without it. When the X-rays demonstrate the absence of stone (p. 590), and there is no renal enlargement nor any evidence of vesical retention, a cure may be expected from purely medical treatment. A climate and water cure at almost any mineral spring, and the long-continued use of urotropin or salol, will always benefit the patient, and will often cure.

The more acute or severe cases demand perfect drainage and vigorous treatment of the septicemia, followed by a prolonged course of mild diuresis and urotropin or salol.

Pyonephrosis requires purely surgical treatment. Drainage is almost the sole essential. Diuresis and urinary antisepsis are important but secondary features.

Abscess of the kidney calls for the knife.

Other Methods of Treatment.—Some surgeons employ the knife, others the ureteral catheter for the cure of almost every form of renal inflammation. I confess that the knife can almost always be employed with some advantage; but I believe that the comfort and safety of the patient may be best insured by some such plan of surgical conservatism as outlined in the preceding paragraphs.

As for the ureteral catheter and lavage of the kidney pelvis, I cannot see that their vaunted cures atone for their manifest inconveniences, dangers, and uncertainties.