The great increase in medical knowledge of recent years has tended more and more to produce specialisation. This obviously has its advantages, since, other things being equal, a doctor who confines himself to one system or segment of the body, should know more about this particular part than the man who has to devote his time to general medicine. It does, however, throw a greater onus on the general practitioner, and more especially in regard to diagnosis, since one of the drawbacks is that the specialist tends to confine himself to his own system and may well overlook some quite obvious condition if it is outside his own speciality. It is therefore of great importance that a reasonable diagnosis should be made by the doctor before the patient is sent to the specialist.

Diagnosis in urology is, on the whole, not difficult, and as is so often the case, the history is one of the utmost importance. Indeed, quite often, a diagnosis can be made from this alone.

There are four cardinal symptoms in urological disorders: pain, frequency of micturition, difficulty of micturition, and haematuria. One of these or a combination of more than one is almost always present in disease of the urinary tract.

Pain

This may be associated with either the upper or lower urinary tract. Renal colic is fairly typical and a severe attack should never be missed. The pain varies inversely with the size, and directly with the degree of movement, of the stone. Indeed, a large branched calculus filling the whole of the renal pelvis and calices may give rise to little or no pain at all and attention may only be directed to it as a result of routine investigation following some abnormality such as albumen in the urine. (See Fig. 1.) Renal Colic usually starts in the loin posteriorly: it passes through to the front, and when the stone reaches the ureter it radiates downwards through the iliac fossa, in the male to reach the testes, and in the female, the labium majus. Occasionally the pain may pass down the thigh, but this is not common. Usually nausea, and often vomiting, accompanies the pain. When the latter occurs, it does not relieve the pain and it may come on at any time during the attack. In contra-distinction to the attitude in peritonitis, the patient twists and turns and often finds greater ease in a doubled-up position.

On examination there is tenderness in the loin and quite often rigidity of the muscles of the loin. On the right side this may simulate appendicitis, especially occurring in a retrograde appendix, but the history of colic should usually draw attention to the renal tract. There is sometimes a little increased frequency of micturition and when the stone is at the ureteric orifice or drops into the bladder, this frequency may become quite marked. There is often macroscopic and always microscopic blood in the urine.

Pain in the loin which does not radiate, and backache, are not necessarily renal in origin. Indeed, more often than not they are unconnected with the urinary tract. If, however, they are accompanied by urinary symptoms, investigation is required. In the early stages of hydronephrosis pain is not uncommon, and when an intermittent hydronephrosis becomes completely obstructed, a severe aching pain in the loin is experienced. The pain of pyelitis is accompanied by pyrexia and frequency of micturition and there is tenderness in the loin. Where there is a large stone in the kidney which has not moved (see Fig. 2), or where there is a tuberculous infection of the kidney, there may be an aching pain in the back. Backache which has not responded to treatment should always have a urological investigation.

In a lesion of the lower urinary tract, pain may be quite an important feature. In acute cystitis, severe stranguary commonly occurs and is a most disturbing symptom. In a vesical calculus, especially where there is no residual urine, pain referred to the tip of the penis at the end of micturition, is again a marked feature.

Pain in the perineum suggests a chronic prostatitis or vesiculitis.
Frequency of Micturition

The number of times a person passes water is dependent upon several factors: (a) the amount of fluid intake; (b) the speed of intake; (c) fluid lost from the body in other ways, e.g. in sweating and diarrhoea; and (d) the external temperature.

Naturally, a person who habitually drinks copious quantities of fluid will either pass urine more frequently or will pass it in larger quantities than one who only takes a small amount.

In people who habitually have a cup of tea or some other type of drink before going to bed, it may be usual for them to get up at night once to empty the bladder. Frequency of micturition therefore varies from patient to patient, and it is only when it has begun to occur without any change in the habit of the patient that it may be of pathological significance, and moreover, unless it occurs at night as well as during the day, it may well be functional.

When a patient complains of frequency it is important, therefore, to find out when it started, whether or not he has altered his habits with regard to fluid intake, or if he has just returned from overseas, since there is no doubt that a common symptom in a person returning from the tropics to this cooler climate, is frequency of micturition.

The cause of the frequency may vary considerably with the age and sex of the patient. In the young of both sexes the most common cause is infection. Bacillus coli will give rise to an acute cystitis or an acute pyelitis, and frequency is a marked feature. The urine will contain pus, often blood and organisms, and on culture these organisms can be identified. The onset of a bacillus coli infection in the first instance is always acute. Other infections such as from gonococcus and staphylococcus are less common. A tuberculous infection of the urinary tract is almost always a more chronic condition. The patient may notice over a period of months that there has been an increasing urge to pass water.

In really acute inflammation of the bladder, the frequency becomes very marked indeed—every ten minutes or even every five minutes—very small amounts of water being passed. There is a constant desire to micturate and the bladder never feels empty. The urine is often streaked with blood and there may be a frank haematuria. A similar state of affairs exists where there is a vesical calculus and no residual urine to cushion the stone.

There is a type of frequency of micturition occurring where there is pus in the urine, but no organisms are found after repeated examinations, so called abacterial pyuria. In the male this is frequently accompanied by a non-specific urethritis.

In the older male patient, frequency of micturition occurs without infection, and then is almost always due to obstruction at the neck of the bladder. This obstruction is usually from enlargement of the prostate. In the majority of cases the enlargement is benign, and on rectal examination, the gland feels smooth, bilobed, elastic and immobile. In some cases where the prostate is hard and irregular, the obstruction is due to a carcinoma of the gland.

Frequency of micturition may occur without infection and without prostatic obstruction. It may be due to hyperpiesis, or be accompanied by hyperpiesis.

Difficulty in Micturition

This occurs in two groups of cases:

1. Where there is mechanical obstruction.
2. Where there is a neuro-muscular incoordination.

Obstruction in the female is almost always due to pressure on the urethra by a tumour arising in the pelvis.

In the male it largely depends on the age group.

In the infant the most common cause is a stenosis of the external meatus. This may be congenital, but it is often due to inflammation and a mental ulcer brought about by acid napkins. The condition is easily recognised, but care should be taken that the infant does not suddenly micturate in the examiner’s face while he is gazing intently at the stenosed meatus.

Phimosis may rarely cause difficulty in micturition in an infant.

In the youth, difficulty is due to either an acute urethritis or to the passage of a small stone along the urethra. The history and examination should make the diagnosis of each of these conditions easy.

In the middle-aged male the commonest cause is stricture. Up to the time when the treatment of gonococcal infections became scientific and specific, the incidence of post inflammatory stricture was quite high. It must now be a rapidly disappearing cause. Especially in view of the increased exposure to trauma from high-speed travel and frequent wars, the traumatic stricture may become actually and relatively more common. The diagnosis of stricture must be confirmed by urethroscopy or instrumentation.

In the older male patient, difficulty in micturition is almost always due to prostatic obstruction. It is estimated that at least one-third of men over the age of 50 have prostatic symptoms of such a degree that they require medical advice. According to Young, H. H. (J. Urology 1945, 53, 188), carcinoma of the prostate occurs in 14 per cent of all men past the age of 44 years, and is three times as common...
Fig. 1.—Bilateral renal calculi discovered on X-ray of a patient, who was found to have albuminuria on routine examination.
Fig. 2(a).—Multiple right renal calculi.
Fig. 2(b).—Specimen from same case. This patient was investigated for back-ache, and the urine was found to contain cystin crystals. The stones were composed of cystin.
FIG. 3.—Diverticulum on the left side of the bladder shown on excretion urography.
Fig. 4.—X-rays of a case of polycystic kidney disease in a patient investigated for bilateral renal swelling.
Fig. 5(a).—Enormous dilatation of left ureter in patient who was found to have albumen and a trace of pus in the urine.
Fig. 5(b).—Specimen from same case showing dilatation of ureter with the kidney relatively normal in size.
FIG. 6(a).—Stone in the right ureter.
Fig. 6(b).—Bilateral hydro-ureter in a patient investigated for recurrent attacks of urinary infection.
Fig. 7(a).—Retrograde pyelogram showing a large left hydrenephrosis, mainly extra-renal in type, with appearance suggestive of obstruction at the pelvo-ureteric junction.
Fig. 7(b).—Specimen removed showing the obstruction due to aberrant renal vessels.
FIG. 8(a).—Small stone in region of the right ureter.
as cancer of any other internal organ in males. Prince, C. L. and Vest, A. S. (South Med. J. 1943, 36. 660), state that 17 to 20 per cent of men over the age of 50 years have carcinoma of the prostate. These figures are not in accordance with experience in this country. In all cases of prostatic obstruction it is wise to do an excretion urography. The function of the kidneys will be shown, and whether or not there has been any dilatation resulting from back pressure. A diverticulum of the bladder is often shown by this investigation. (See Fig. 3.)

Neuro-muscular Incoordination

Disturbance of micturition occurs in many lesions of the nervous system. In complete transverse lesions of the spinal cord or of the cauda equina micturition is always affected. In others this is not constant. The most important of these are syphilis of the nervous system and disseminated sclerosis, in both of which difficulty of micturition frequently occurs.

Haematuria

Fortunately, most patients are alarmed at the appearance of blood in the urine. As a small amount appears to be much more when diluted with water, it is not often that blood is passed with the patient unaware of its occurrence. It is always a sign of the utmost importance. Frank haematuria in the absence of casts portends a surgical lesion. Associated with pain it is usually due to a moving stone. Indeed, before the advent of X-rays, an important test for stone in the kidney was to make the patient jump to the floor from a kitchen table and if shortly afterwards blood appeared in the urine, the diagnosis was said to have been established. Associated with frequency, and especially if blood appears at the end of micturition, one must always suspect either an acute inflammation at the base of the bladder or a vesical calculus. Injury, of course, followed by haematuria, indicates that the urinary tract has been involved in the trauma. If renal, the blood is well mixed, and there may be fine clots—ureteric casts—which may give rise to colic. There may be a well-mixed haematuria in a slight injury of the bladder, but if this is at all severe, extravasation will have occurred, and neither urine nor blood will be passed. In an injury of the urethra, blood escapes from the external meatus independent of micturition.

The most common cause of painless haematuria is a growth in the urinary tract, and the most common growth is a villus papilloma of the bladder. With painless haematuria and a swelling in the loin, a neoplasim of the kidney may be confidently diagnosed. Not infrequently, haematuria may be the chief symptom of an enlarged prostate, although it is very rarely the only one. In such cases it is common to find blood at the external meatus immediately after a rectal examination has been done.

In the absence of injury, blood from the urethra independent of micturition is usually associated with vesiculitis, when there is also a blood-stained emission. Very rarely it is due to a urethral papilloma.

Having taken an adequate history, the patient must be examined. His general condition should be assessed: a dry tongue with thirst may indicate failure of the kidneys; a moist, clean tongue, without thirst, means the kidney function is adequate. It is not common for abdominal examination to reveal anything abnormal. In thin people the lower pole of each kidney can usually be felt, but in the well-rounded or obese, this is not possible. It is usual to palpate both kidneys from the right side of the patient, the left hand being passed under the back to the left loin. If the kidney feels enlarged it may be due to a neoplasm, to hydronephrosis or to cystic disease. A hydronephrosis is smooth and cystic. A neoplasm may be smooth, but is usually irregular, is much harder, and feels solid. A cystic condition may be smooth, when there is a single cyst, or irregular and hard when there is polycystic disease. (See Fig. 4.)

A distended bladder can usually be felt supra-pubically, rising out of the pelvis, but even if not palpable there is dullness on percussion. On rectal examination the prostate and vesicles can be felt. Normally the gland is smooth, flat and firm. When benign enlargement takes place it becomes more elastic, but remains smooth and the lobes on either side bulge into the rectum and are differentiated by a mid-line groove. If the enlargement is mainly intra-vesical, there may not be much projection into the rectum, but it may be felt bimanually. If one or both lobes of the prostate are hard and irregular, then carcinoma of the gland should be suspected. An infiltrating carcinoma of the bladder may be felt per rectum, more especially bimanually, and if this is so, it usually means that the prognosis is grave.

Urine Examination

The urine must always be examined for sugar and albumen. If either of these is present, further investigation is required. If the urine remains cloudy, after heating and adding acetic acid, it is almost certain that there is an infection or a haematuria present. In this case a centrifuged deposit should be examined microscopically and a bacterio-
logical culture of a sterile specimen should be made. If tuberculosis is suspected, at least three specimens from the early morning urine, passed on three consecutive days, should be examined for tubercle bacilli. If still negative, a culture should be made or a guinea pig injected with a specimen of the urine. A chronic infection of the urinary tract in the absence of tuberculosis, is usually due to some obstructive lesion or the presence of calculus, and if the chronic infection fails to clear up under course of chemotherapy a further investigation should be undertaken. A considerable lesion of the urinary tract may be present with little or nothing in the way of signs or symptoms. (See Figs. 5 and 6.)

X-ray Investigations

All patients with a suspected surgical lesion of the upper urinary tract should be X-rayed. In the large majority of cases this examination should take the form of an intravenous pyelogram. The function of both kidneys will be revealed and the presence of an hydronephrosis, except when there is little or no function, will be shown. If no shadow appears on excretion urography, then a retrograde pyelogram may be indicated, when a large hydronephrosis may be demonstrated. (See Fig. 7.) The position of a renal calculus will be given and any obstruction from a ureteric calculus will be revealed. (See Fig. 8.) It may show a filling defect from a neoplasm of the kidney, but as a general rule the greater capacity of the retrograde pyelogram is required for this.

With the history, physical examination, examination of the urine and X-ray, a diagnosis will have been established in many cases, and all that remains is to refer the patient to a specialist for confirmation of diagnosis and for advice as to the necessity and scope of treatment.
Fig. 8(b).—Dilatation of ureter and pelvis indicating that operation was necessary.
A less obvious mistake, where the needle has transfused the vein and the solution is invading the tissues deep to the vein. This is only noticed when the patient complains of pain, or when the swelling itself becomes obvious.

Removal of the needle, massage and immediate treatment with anti-phlogistine for at least twenty-four hours is necessary.

An obvious mistake.

a. The needle partly pierces the vein, blood withdrawn into the syringe and at the same time the needle comes out of the vein.

b. The solution injected into the surrounding tissues, producing a weal.

The needle should be taken out completely. The site of puncture massaged and treated with hot anti-phlogistine packs.
Correct method for injection.

The approved method of intravenous injection.

a. A record syringe 10 c.c.'s eccentric nozzle.

b. A seeker tube, a needle, size 14, short bevel.

c. The injection in three movements:
   1. Piercing the skin.
   2. Traversing the intervening tissues.
   3. Piercing the vein.

   The bevel of the needle may be up or down. It is purely a matter of choice.
Injecting a vein on the back of the wrist—other more suitable veins are not to be found.