

distinguishable from it by other signs of disease of these organs. Renal hæmorrhage may be due to injury, acute inflammation, stone, tubercle, cancer, parasites, or blood changes. The history of the case decides whether it is due to *injury*. When due to *inflammation*, it is accompanied by excess of albumen, by tube casts, and is usually associated with œdema and other signs of blood change. Hæmorrhage due to *stone* is chiefly characterised by its being increased by exercise or movement, by the pain, and sometimes by the passage of gravel. Hæmorrhage due to *tubercle* is recognised by the detection of tubercle elsewhere, by fever, and by the admixture of pus with the blood. The hæmorrhage of renal *cancer* may be very profuse or very slight; the formation of a renal tumour leads to its diagnosis. The signs of *hæmophilia*, *scurvy*, *purpura*, *fever*, and the causes of *renal congestion* are so apparent that the diagnosis of hæmorrhage from these sources is easy. Hæmorrhage as a part of *chyluria*, is recognised by the fibrinous coagula, the milky colour due to fat, and possibly by the detection of filariæ in the blood.

Pyuria.—Pus is a frequent addition to urine, and is recognised by turbidity of the urine, by the presence of albumen and pus cells, and, when the pus deposits in quantity, by the fact that liquor potassæ converts this deposit into a very ropy tenacious fluid. If the pus be found only in the first of the three glasses of urine, or escape from the penis independently of micturition, it is *urethral*, either due to *catarrh* of the mucous surface, or to *abscess* opening into the urethra. Small opaque threads and flakes passed with the first few drops of urine are evidence of *gleet* with lodging of the discharge in the deeper parts of the urethra. A sudden discharge of pus in the urine indicates the bursting of an *abscess*, the seat of which will be shown by swelling and pain; if the act of micturition end in

the passage of a small quantity of pus, it points to suppuration in the *prostate*. The passage of very ropy *mucopus* in alkaline foul-smelling urine shows that there is *catarrh* of the *bladder*; where the pus is in excess of the mucus it is called *suppuration* of the *bladder*. Pus without mucus in acid, undecomposed urine, is derived from the pelvis of the *kidney*, or more rarely, from an abscess opening into the bladder or ureter.

Mucus is a normal constituent in urine: it is increased in amount in inflammation of any part of the urinary tract. *Semen* may normally be found in small amount in urine, but especially after a seminal emission. The passage of *flatus* or of *fecal* matter recognised by the animal and vegetable fibres and cells as well as by its colour, consistence and odour, shows that there is a communication between some part of the alimentary canal and the bladder; this condition is attended with extreme pain, sometimes by retention, and it always leads on to cystitis. The surgeon must endeavour to determine what part of the intestine opens into the bladder by the colour and consistence of the *fecal* matter. This communication may be a congenital malformation, but is more often due to cancerous ulceration, to typhoid ulceration, or to pelvic abscess: the history of the case clears up the diagnosis. For the diagnostic significance of *bile* in the urine, and of the various *crystalline deposits*, the reader must refer to other works. The passage of *hair* or of masses of sebaceous matter indicates the opening of a *dermoid cyst* into some part of the urinary apparatus. *Echinoccus* hooklets have been found in urine and *hydatid vesicles* have been passed *per urethram*.

Where the symptoms point to the presence of a *tumour of the bladder*, the deposit must be carefully and repeatedly examined microscopically. The

presence of a large quantity of bladder epithelium or of irregular polynucleated cells corroborates the suspicion; but if a villus or fragment of the growth can be detected, it establishes the diagnosis: such fragments are recognised by their shape and size, and especially by the regular arrangement of the epithelium, or by the detection of a capillary. The shreds may be found in the urine passed naturally, or one may be removed in the eye of a catheter; but the best way to obtain them is, after emptying the bladder, to introduce an evacuating tube, and to wash the bladder out with warm water by means of an exhausting bottle.

IV. Examination of the urethra, prostate, bladder, and kidneys.—A. **The urethra and prostate.**—The orifice of the urethra may be found at the base of the glans penis (a very common deformity) or more rarely at the root of the penis, or in the perineum, the scrotum being split: these conditions are all varieties of *hypospadias*. The state of the orifice, and the presence of discharge, if any, are to be noticed. The orifice may be too small (*stricture of the meatus*), or *warts*, *chancre* or *epithelioma* may be seen on it. (See page 498.) Should the orifice be swollen and covered with a gummy discharge, and be the seat of itching and smarting, and these signs be noticed two to seven days after coitus, it is the *initial stage of acute urethritis*. If there be an abundant thick yellow or greenish discharge, and the penis be swollen, and the urethra feel hard and tender, there is *acute urethritis*; when the discharge becomes milky in colour, and the pain and swelling subside, it is called *chronic urethritis*; and if the discharge consist only of shreds voided in the first portion of the urine, or of a drop of gummy discharge at the meatus seen perhaps only in the morning, it is *gleet*. If the discharge be sanious, and

an ulcer is seen just within the orifice, it is a *soft chancre*. A sero-purulent discharge with little or no pain, associated with a firm lump in the urethra near the orifice, multiple enlargement of the inguinal glands, and followed by sore throat and a rash, is due to a *hard chancre*. *Gonorrhœa* is distinguished from other forms of urethritis by the long incubation period (from 2 to 7 days), and by the intensity of the symptoms. A painless muco-purulent discharge is sometimes seen in secondary *syphilis*. Gouty, traumatic and non-specific urethritis are to be distinguished by the history and concomitant affections. *Gleet* may be caused by chronic urethritis or prostatitis, by a stricture, or an urinary fistula. Now let the surgeon pass his fingers back along the urethra to the perineum; it is found swelled and tender in acute urethritis, or hard and knotty in severe stricture; if a painful and tender ill-defined firm swelling be felt in the anterior perineum, it is a *perineal abscess*; in its later stages fluctuation may be felt. A similar swelling with much surrounding œdema may be found over the urethra where it is covered by the scrotum; the pus being under the ejaculator urinæ muscle, the abscess then points at the root of the penis.

Then pass the finger into the rectum and feel the prostate; if it be found acutely tender, hot and swelled, there is *acute prostatitis*, and if the swelling be soft and fluctuating it is a *prostatic abscess*. But if it be found enlarged, notice its size, outline and consistence. If the patient be over fifty-five years of age and the enlargement be firm and rounded, it is probably *hypertrophy* of the organ; but if the enlargement be very great, or increase rapidly, be irregular in outline and consistence, and especially if there be hæmaturia and enlargement of the pelvic and lumbar glands, it is *malignant disease of the prostate*. A nodular enlargement of the prostate in a young or

middle-aged man is probably *tubercular*, and if tubercle be found in his lungs or testicle, or the vesiculae seminales are found enlarged, or the bladder and kidneys are affected, this diagnosis is certain. The prostate may be found *atrophied*. At the same time the finger should examine the base of the bladder and the seminal vesicles. The tense rounded base of a distended bladder, or a vesical calculus, or a vesical tumour, or a nodular enlargement of the seminal vesicles (one or both) from tubercle may thus be detected; this examination is much facilitated by firm suprapubic pressure. If a firm, well-defined tumour be felt in the bladder it is cancerous; the benign tumours are softer and more ill-defined.

A full-sized catheter or bougie should now be passed, and the fact of undue pain or of obstruction noticed. Sharp pain at a particular spot in the urethra points to a *local inflammation*, and is an useful indication of the source of a gleet discharge or perineal pain. If obstruction be met within six inches of the meatus it is generally due to *stricture*; obstruction beyond that point is usually from *prostatic enlargement*, and if this obstruction be overcome by depressing the shaft of the catheter, or when an instrument is in the bladder the shaft be found to be greatly depressed, it points to what is called enlargement of the *middle lobe* of the prostate. The length of the urethra is to be measured by the length of catheter introduced before the escape of urine. When *stricture* is met with the surgeon has to notice the position, size, and number of the narrowings.

The examination is best made with "acorn" or "bullet-headed" graduated probes, or Otis's "urethrometer"; if the meatus be narrowed this may have to be incised as a preliminary measure. The resistance offered by a stricture is more clearly perceived by one of these instruments than by an ordinary

bougie, but they are especially useful in the detection of multiple strictures, for a narrowing through which the bulb has passed does not grasp the slender stem, and so the onward movement becomes again easy, unless a further stricture is met with.* Any narrowing or resistance offered to the passage of an instrument, which passes off when the patient is under the full effects of an anæsthetic, is due to *spasm*. Spasm can also sometimes be diagnosed by noticing the sudden yielding of a stricture under the gentle continuous pressure of the end of a bougie. Obstruction to the passage of urine or of a bougie due to swelling of the mucous membrane is sometimes called *congestive stricture*; it is met with in urethritis, acute prostatitis, and peri-urethral abscess. Urethritis is recognised by the discharge; prostatitis by the pain in and swelling of that organ; peri-urethral abscess (prostatic or perineal) is recognised by pain, swelling, and in some cases by fluctuation.

If in passing a catheter a grating be felt, it shows that there is an *urethral* or *prostatic calculus*, and the exact position at which the grating occurs, as measured by the stem of the catheter, distinguishes between these two. If, as the catheter is passed, a sudden flow of pus occurs, it shows that a *peri-urethral abscess* has been opened; these are most commonly prostatic, but the position of the abscess is easily ascertained by the detection of swelling. If on passing a catheter the shaft be found to deviate from the middle line, or the instrument pass in to its full length without reaching the bladder (except in cases of prostatic hypertrophy), pass the finger into the rectum, and if the catheter be felt very superficial, or to one or other side, it has passed into a *false passage*. If, when the surgeon is trying to overcome an obstruction,

* There is difference of opinion among surgeons as to what may be held to constitute a pathological narrowing of the urethra.

the catheter suddenly slip on with a soft grating sensation, and blood escape, he knows that he has made a false passage; an instrument is never grasped by a false passage as it is by a stricture or by the compressor urethræ muscle.

B. The bladder.—For signs of a distended bladder, see page 292. The *capacity, competence, and power* of the bladder, and the presence in it of *foreign bodies or tumours*, are the facts to be ascertained by examination of the bladder. If, immediately after the patient has passed water, a catheter be passed and urine flow off, the *bladder is incompetent*, and the amount of the "residual urine" should be measured; if the urine flow through the catheter slowly and feebly there is *atony of the bladder*, but should it be propelled with normal power the chronic retention of urine would then be due to *obstruction* to its outflow, either urethral stricture or hypertrophy of the prostate. In the large majority of cases "residual urine" is a sign of atony. If the amount of residual urine be added to that passed by the patient, and the total measured, it will give the capacity of the bladder. As we have seen, frequency of micturition is not a sure sign of small size of the bladder; but if the frequency be chronic and the bladder be competent, the bladder is undoubtedly small; the amount of fluid that can be injected into the bladder without meeting with resistance, and the freedom with which a sound or a lithotrite can be manipulated in the bladder, are other means of estimating the *capacity* of a bladder. A small bladder is met with in old tight stricture, in stone in the bladder, in some cases of chronic cystitis, and in long-standing vesical fistula. It is important to know the size of the bladder before performing lithotripsy or lithotomy.

If, on drawing off the water, the flow cease and the bladder apparently be empty, but on pushing the

catheter in a little farther or moving it in the bladder, some more urine flow out, especially if it be different in appearance to that before drawn (alkaline, purulent), a *sacculus* may be diagnosed. A *sacculus* is also to be diagnosed when, on emptying the bladder, a fluctuating swelling is felt above the pubes, from which, by pressure, urine can be expelled through the catheter.

The next step in diagnosis will be to explore the bladder with a *sound*. This should first be done with the bladder moderately full, and then, if no stone be detected, with the viscus empty, and for this reason a hollow sound is convenient. As the sound passes into the bladder it may grate over an urethral or prostatic calculus. If the end of the sound be freely movable from side to side the surgeon knows it is in the bladder. It is possible to fall into error by passing the sound into a false passage, or no farther than the dilated prostatic urethra. An audible click and a feeling of firm resistance are the signs of *stone in the bladder*. The surgeon must not mistake for this, mere roughness of the bladder, *fasciculated bladder*, which gives rise to no click; or soft *sabulous matter*, which causes a soft grating sensation; or contact with the *sacrum or ischial spine*, which also does not give a click, but only a feeling of resistance; or a *tumour*, which occasions more or less resistance to the free movement of the sound, but does not give a click or grating sensation. The "sound" of a stone in the bladder, therefore, is the safe test of its presence. A stone may be missed by an incomplete examination of the bladder, or by its being covered over with a fold of the mucous membrane or a thick layer of blood clot or mucus.

A *stone in the bladder* being diagnosed, the surgeon must determine the nature, size, number, and position

of the calculi. An examination of the urine will determine the composition of the outer crust of the stone, while the history of the case, and the prevailing condition of the urine, if known, will tell the probable composition of the nucleus and bulk of the calculus. If the urine be acid, and deposit uric acid and urates on cooling, the calculus is *uric acid and urates*.

If the deposit consist of *oxalate of lime* the calculus may be assumed to be of that nature; while alkaline urine, with deposit of phosphates, will indicate that at any rate the crust of the stone is *phosphatic*. If the stone be felt to be smooth, and give a sharp click, it is *uric acid*; if it be rough or nodular, and give a clear click, it is *oxalate of lime*, and if it give a softer duller sound, it is *phosphatic* on the exterior. Calculi known to be formed around foreign bodies in the bladder are *phosphatic* on the exterior. Calculi in children are generally composed of *uric acid or urates*.

The *size of a stone* is best ascertained by grasping it in a lithotrite two or three times, and measuring the distance apart of the blades. It may be more roughly estimated by passing a sound to one extremity of it, and marking the level of the urinary meatus on the stem, and then drawing the sound over to the opposite end, and again marking the meatus; this should be done in two directions.

The *number of stones* present.—Usually there is but one. The sound may at once detect a great number, giving a sensation as if in a bag of small marbles or a small "gravel pit." Or the signs of stone may be detected in two or more distinct parts of the bladder. The most certain evidence, however, is to grasp one stone in a small lithotrite, and then use that as a sound, and if it be felt and heard to tap against another stone, it shows that two at least are present.

The *position of the stone* is a matter of great importance in view of operation. If the stone be found

in different places at different times, or if the sound pass over a great area of stone, or if the stone can be grasped in a lithotrite, it is certainly *in the bladder*. But if it be detected with difficulty, or only occasionally, especially if the sound cannot be passed over more than one side of it, or if it cannot be grasped in a lithotrite, it is probably *sacculated*.

If no stone be detected the surgeon must notice carefully whether the sound meet with resistance at any part, or whether contact with a particular spot causes sharp pain (a sign of *ulcer of the bladder*), and whether the examination occasions smart hæmorrhage, which indicates a *vesical tumour*. If the resistance to the sound be distinct and firm, and an induration be plainly felt from the rectum, while the pelvic glands are enlarged, the patient emaciated, the urine containing blood, much epithelium and some mucus, it is to be diagnosed as *cancer of the bladder*; there is usually great pain and frequency of micturition, and these precede the occurrence of hæmorrhage. Where hæmorrhage from the bladder is the first and chief symptom, and is subsequently followed by frequency and pain, a *benign tumour* of the bladder is to be suspected, of which *fimbriated papilloma* is the commonest variety, and the one attended with most hæmorrhage.

Where a tumour of the bladder is suspected or diagnosed, or in any case of persistent pain in the bladder, or of chronic cystitis, for which neither cause nor cure can otherwise be found, *digital exploration of the bladder* should be made. In the female the urethra is dilated to admit the finger; in the male the membranous urethra is opened from the perineum, and the forefinger passed in; with the left hand or by an assistant, pressure is made above the pubes, in this way the whole interior of the bladder can be well examined. The finger will first pass over the neck of

the bladder, and should feel for prostatic outgrowths, fissures and ulcers. In the bladder, tumours of various kinds, sacculated stones, stones impacted at the orifice of the ureter, sacculi and ulcers are the conditions that may be met with. The nature of most of them will be at once evident. Stone at the orifice of the ureter will be felt as a hard lump at the base of the bladder, covered all over with mucous membrane, and with the finger nail, or a pointed probe, the latter may be pierced and the stone actually felt. Care must be taken not to mistake a bladder inverted by firm suprapubic pressure for a tumour. If a tumour be found, its consistence, size, shape, exact position, and especially its mode of attachment to the bladder, must be carefully ascertained. In children, a soft, pedunculated *mucous polypus*, like those common in the nose, may be found. In adults, if the tumour be very soft, flocculent, and pedunculated, it is a *fimbriated papilloma*; if firmer and sessile, but not ulcerated, it is probably either "*fibro-papilloma*" or the *transitional* tumour of Thompson.* *Scirrhus* will be recognised by its hardness; *epithelioma* by its ragged, ulcerated surface and indurated edge and base; *encephaloid* by its rapid growth; all these three alike will be found in elderly adults, and there will probably be glandular enlargement, wasting, and cachexia. Mr. Bryant has found and removed a *dermoid cyst*. The structure of the tumour should be proved by removal of a fragment, and its microscopical examination.

C. The kidney.—For the methods and results of examination of the kidney, the reader must consult works on medicine. In cases of stone in the kidney, a long needle may be thrust into the organ from the loin, in the hope of striking the calculus. In the female the ureters may be catheterised after dilatation

* See "Tumours of the Bladder," by Sir H. Thompson.

of the urethra, and the urine from each kidney collected separately in cases where it is important to determine which kidney is the seat of suppuration, and whether the other organ is functionally sound, e.g. tubercular disease.

Urethral fever.—When, soon after the passage of a catheter, the operation of lithotrity, or some similar local irritation, the patient is seized with a rigor, followed by great heat of skin, and then by a profuse sweat, the temperature rising considerably during the rigor and falling to the normal during the sweat, and the whole illness passing off in a few hours, the illness is *acute urethral fever*. The attack may vary much in intensity; it resembles a paroxysm of ague or a pyæmic rigor, but is characterised by its transient character and its connection with urethral irritation. When the attack is repeated at the interval of a few hours or a few days, it is called *recurrent urethral fever*. When a patient who is using a catheter suffers from chronic pyrexia, with marked asthenia, a dry brown tongue, anorexia, mental stupor, or a low muttering delirium, it is *chronic urethral fever*. The temperature may be but little raised or vary much from time to time. This form of fever is generally met with in the subjects of chronic vesical incompetency with deficient excretion of urea. Some cases of so-called *urethral fever* are septic in origin.

CHAPTER XLIII.

DIAGNOSIS OF DISEASES OF THE HAND.

THE hand is sometimes greatly distorted by the contracting scars of a *burn*; to be distinguished from this is a spontaneous disease of the skin lasting many