The adrenal gland was present and in its usual situation, but was supplied with blood by branches of the diaphragmatic arteries only, the usual aortic branches being absent.

The left kidney was twice the normal size, and weighed 12 oz.; it was of the usual bean shape with a smooth surface, and it lay in the normal position. A section showed chronic congestion, the result of a gradually failing heart; its vessels were at least twice the normal size, but the pelvis and ureter were normal both in size and shape.

The bladder was healthy, but the trigone gave a very curious appearance, the result of the absence of the right ureteric opening, the plica ureterica, and the interureteric bar. The left ureter opened in the usual situation, and its orifice was healthy; but the band of muscle which passes down from the ureter, and which should interlace with its fellow of the opposite side before passing downwards (forming the prominences of mucous membrane known as the plica ureterica and the interureteric bar), in this case ran straight down to the crista gallinaginis of the prostatic urethra, which it appeared to join. The result of this was to give the base of the bladder a curious lop-sided appearance which must be quite characteristic and could not be mistaken if seen by the cystoscope.

Fig. 1. shows the trigone and prostatic urethra of a normal bladder, the ureteric bands of muscle interlace to form the interureteric bar, and then unite to pass down to the crista gallinaginis of the prostatic urethra. A, Interureteric bar. B, Ureteric opening. C, Plica ureterica. D, Crista gallinaginis.

Fig. 2 shows the trigone and prostatic urethra as it appeared in the case of "solitary kidney" just reported. Only the left ureteric opening and band of muscle are present, and the latter passes straight down to join the crista gallinaginis, a condition which could be at once recognized by the cystoscope. E, Ureteric opening. F, Plica ureterica.

Having described the various forms of "solitary kidney" and given an example of one of them, the question arises, given one of these cases, how are we to diagnose it?

Beyond the usual clinical ones there are several methods at our disposal, one or other of which we should be ready to make use of when the occasion arises; and it is well to bear in mind that, although we may suspect complications in a given case, yet the accident usually occurs when the surgeon feels most sure of himself, therefore some attempt to estimate the working value of the *other* kidney should always be made before any kidney operation is undertaken.

The methods at our command are as follows:

1. *Cystoscopy*.—Examination of the bladder with the cystoscope may be done practically without risk by any one accustomed to its use. By means of it we can see the number, shape, and general appearance of the ureteric orifices and the state of the urine as it is expelled from each, and by the use of the ureteric catheter we can collect samples of urine directly from each kidney and apply the usual tests to them, which will often tell us all that we require to know; but, if necessary, we can also make use of special methods for estimating the comparative function of the two kidneys, such as their activity in excreting methylene blue, or in forming sugar after the injection of phloridzin. Within the last few years we have learnt that a diseased kidney will very frequently produce changes in the corresponding ureteric orifice, which in certain cases are quite characteristic, and in others allow us to draw valuable deductions as to the state of the kidney. These changes can only be observed by a skilled use of the cystoscope.

2. *Segregation*, or separation of the bladder into two halves by a special instrument, which enables us to collect the urine from the two kidneys separately. This process is valuable in those instances (happily rare when the observer is a skilled cystoscopist) in which, for some reason or other, it is not possible to use the cystoscope. It can also be combined with the methylene blue or phloridzin-glycosuria methods of comparing kidney function, but by its use alone the valuable positive evidence of sight gained by the cystoscope is lost, besides which it is not nearly so reliable as ureteral catheterization.

3. *Inspection of the two Kidneys*.—This requires a second operation to be undertaken and increases the severity twofold, besides which it is often quite impossible, without dissecting an organ, to say whether or not it is seriously diseased; therefore, when either of the above non-operative methods is available, the extra manipulations, with their added risk, are not nowadays often made.

If this imperfect summary of an ever-increasing branch of urinary surgery should lead to a more frequent use of the cystoscope and its adjuncts before any operation is undertaken on the kidneys, I feel sure that surgeons will be convinced of its utility and feel amply repaid for the little extra trouble it entails.

REMARKS ON TRAUMATIC RUPTURE OF THE KIDNEY.*

By CORNELIUS A. GRIFFITHS, F.R.C.S.,
ASSISTANT SURGEON, CARDIFF INFIRMARY.

THE remarks I have to make are based upon two cases of subparietal rupture of the kidney which came under my care during 1907.

CASE I.

Arthur T., aged 22, a coal trimmer, was admitted to the Cardiff Infirmary on January 17th, 1907, at 4.45 p.m., with the following history: He was running along the iron deck of a ship, slipped and fell sideways to the left, and in falling struck his left side just below the ribs against a large piece of coal on the deck, with a sharp edge upwards. He got to his feet at once unassisted, and, though he felt very faint, managed to climb a ladder to the upper deck, down another ladder to the deck side, and walked to a shed close by and sat down; he felt no particular pain in his side, but was "generally bad." About five minutes after the accident he tried to pass water, and was alarmed to find he was passing what appeared to be pure blood; after this he felt much worse, and nearly fainted, but he did not lose consciousness, nor did he vomit. He was assisted on to an engine, and afterwards on to an ambulance, and brought to the Infirmary.

Condition on Admission.

The patient was suffering from shock; pulse 84, temperature 98.6°; not greatly blanched. He complained of pain all over the abdomen, but more especially over the left lumbar region. There was marked tenderness under the left hypochondrium and all down that flank, preventing deep palpation; the rest of the abdomen was only slightly tender. Percussion did not elicit any unusual dullness. There were a few slight abrasions upon the left flank but no fractured ribs. He passed 1 oz. of bright red bloody urine, and complained of a burning sensation on passing it. No clots were passed, and there was no pain in the bladder. He was put to bed, kept warm, and a hypodermic injection of ergotin citrate ($\frac{1}{10}$ grain) given. A little later the temperature was 98.5° F., the pulse 110; he was weaker, and had passed 1 oz. of nearly pure bright red blood. At 6.30 I saw the patient and decided to explore the kidney for rupture.

Operation.

The usual oblique lumbar incision was made over the left kidney. The perirenal fat was infiltrated with a quantity of recently-effused blood, which was cleared away; the kidney, when brought into view, was seen to be torn on its posterior aspect, about the middle, the tear extending from the convex border to the hilum, deeply into the kidney substance, and communicating by a small opening with the pelvis. The torn surface of the kidney was still bleeding freely. Having ascertained that the kidney contained no stone, the tear was sewn up with iodized catgut, and bleeding stopped. The wound was closed in layers with catgut, provision having been made for drainage by gauze wick reaching the kidney.

Progress.

The next day, January 18th, drain removed, urine blood-stained. January 20th, only a trace of blood in the urine. January 25th, urine clear, a trace of albumen. January 27th, urine clear, wound healed "primarily." January 29th, allowed up. February 4th, discharged well.

* A paper read at a meeting of the Cardiff Medical Society, February 11th, 1908.

CASE II.

John R., aged 48, from Pontypridd, a collier, was admitted to the Infirmary on June 13th, 1907. Patient was engaged in "timbering," and one of the pieces of timber became dislodged; he saw it falling and tried to get out of the way, but one end of the timber struck him on the left loin a severe blow. He left work and was sent to Cardiff (about 13 miles distance).

Condition on Admission.

When first seen by the house-surgeon the patient was in a kneeling position in the receiving-room upon the floor, unable either to sit up or lie down without pain. He was placed upon a couch and lay with knees drawn up, any attempt to straighten them causing great pain in the abdomen. The abdominal muscles were kept very rigid; tenderness was marked over the left lumbar region, which was also dull on percussion, the dullness extending forward in a curved line as far as the level of the anterior spine of the iliac crest. There was a good pulse of 88, but the patient was vomiting bile-stained material. A specimen of urine passed after the accident was brought with the patient, and contained bright red blood. A diagnosis of rupture of the left kidney was made and the patient removed immediately to the operating theatre.

Operation.

The usual lumbar incision was made and the left kidney found after removing large clots of blood. A large transverse tear was seen nearly separating the lower third of the kidney. The original incision was converted into a J shape in order to expose the upper part of the kidney, when another tear, longitudinal in direction, was found reaching nearly to but not quite joining the transverse one. This vertical wound was midway between the convex border and hilum, upon the posterior surface, but no wound was found in the pelvis or ureter. On attempting to close the wounds in the kidney with iodized catgut, it proved so extremely friable that the sutures cut through its substance on very slight traction (mattress sutures were employed); a few, however, were put in, and the surfaces of the wounds very lightly approximated. I then made use of the fibro-fatty capsule, and sewed the kidney up in that as in a bag. The wound was closed by a series of catgut sutures, provision being made for drainage by a rubber tube reaching the kidney capsule. The patient was put to bed in good condition.

Progress.

The next day (June 14th), there having been free oozing of blood, the dressings were changed. Temperature, 99°. Blood in urine. June 15th. Dressed; temperature, 100°; blood (less) in urine; condition good. June 18th. Drainage tube removed. June 19th. Urine free from blood; trace of albumen. July 4th. Patient got up; wound nearly closed. July 6th. Discharged well.

Subparietal—as distinguished from incised, punctured, and gunshot—injuries are the most common of the injuries to which the kidney is liable, and I think the two cases I have quoted are fairly typical of this class of injury; they are also more common than one might at first be inclined to believe, considering the protected situation of the organ in question.

The history also is fairly common—a severe blow over the region of the kidney; but crushes, falls from a height, and "run over" are more usual causes than simple blows. It also must be borne in mind that the kidney can be ruptured without any externally-applied violence at all. Morris¹ quotes three cases in which the kidney was ruptured by muscular violence, simple muscular contraction.

How far the condition of the kidney contributes to its rupture I cannot say, but I was struck by the extreme friability of the organ in the second case, and I could not help wondering whether its very friability had not much to do with its rupture, or whether contusion had made it friable. It certainly did not look particularly bruised.

Haemorrhage, indicated by blood in the urine, was present in both cases, and it is typical of ruptured kidney; but here, again, we must not forget those cases in which haemorrhage may apparently be absent because the ureter is blocked by clot, or those cases in which the ureter has been torn across, or, again, in milder cases of injury where there is a subcapsular haemorrhage without haematuria. That haematuria following abdominal injury is not pathognomonic of kidney injury must also be remembered. Morris quotes the case of a boy with a villous growth in the bladder, but who only had haematuria after an injury to the abdomen.

Abdominal pain, especially in my second case, where it was most marked, raised the question of intraperitoneal injury, which is an unfortunate but not uncommon occurrence in cases of ruptured kidney, from the simple leaking of blood through a torn peritoneum to the

crushing of other viscera, etc., but no peritoneal injury was discovered at the operation.

In each of my cases it was the left kidney which received injury, but I believe the accident is rather more common on the right side.

With regard to the treatment of ruptured kidney, it may be said, without going into statistics, that the percentage of cases operated upon followed by recovery is greater than that of cases treated by palliative measures.

As to the exact nature of the operation, that, of course, must be decided on the merits of the case; I would not hesitate to remove a hopelessly disorganized kidney, or a completely detached portion of a kidney. In both these cases the whole kidney was fortunately saved.

REFERENCE.

¹ *Surgical Diseases of the Kidney and Ureter* (Henry Morris).

CERTAIN INFECTIONS OF THE URINARY TRACT, WITH SPECIAL REFERENCE TO TUBERCLE, GONOCOCCUS, AND BACILLUS COLI COMMUNIS.*

By G. LESLIE EASTES, M.B., B.Sc.LOND.

THE infections of the urinary tract might well be compared to antimony, of which the chemist of old said that a man might spend his lifetime in investigating it without exhausting its properties. Hence, to-night I am limiting my remarks to the three commonest microbic infections of the tract, dealing with certain aspects of the clinical pathology and treatment by bacterial remedies.

To those who, like myself, have suffered themselves to be bound to the seats of the mighty microbe, the outlook is necessarily narrowed though the magnification is increased, and in concentrating the vision upon the parasite the host may be overlooked, so I must ask your forbearance if I deal too closely with the minute.

The first essential in clinical pathology is to know the anatomy and histology of the normal, and I will briefly enumerate the salient points in order to elucidate the reasons for inferences drawn from observations upon clinical material.

The urinary organs consist of an unbroken epithelial tract, from the Malpighian bodies to the meatus. The character of the epithelium varies with its functions, being in part secretive and excretive, in part protective or transmissive. The structure of each organ depends upon the function of its epithelium. As the renal epithelium is wholly secretory and excretory, it demands a relatively enormous contiguity with blood vessels, hence the unusually close capillary network surrounding each Malpighian body and tubule, and hence also the length of the tubule.

As the intact epithelium of the Malpighian body affords the head of fluid which is to wash out the urinary salts in the tubule excreted by the lining membrane of that part, there is no need for any muscular apparatus. But in order that the secreting apparatus may be in the highest state of efficiency, the secretory layer is reduced to one cell thick, the cells being columnar, almost cubical, in shape.

The renal pelvis has a different part to play. It is but the gathering ground of all the minute tributaries to the combined stream, and acts as a conduit to the aqueduct which serves to convey the urine from the position of security in which the kidneys are lodged, to the organ which has been evolved in the course of ages for temporary storage. As neither renal pelvis, ureter, nor bladder plays any part in excretion, the epithelium is of a different character, and approximates to that of the skin, being several layers thick, to serve as a protection. As the ureter and bladder are transmissive in function, the walls of each are provided with involuntary muscular layers. The renal pelvic and ureteral epithelium is identical, and belongs to the small transitional type, and in transverse section it is seen to consist of a layer of cells, four or five thick, of which the superficial are flattened, the deeper pear shaped or spindle.

The epithelium of the bladder belongs to the large transitional type, the individual cells being larger than

* Read at a meeting of the Kensington Division of the British Medical Association.