The surgery of the kidneys.

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SURGERY OF THE KIDNEYS,

J. KNOWSLEY THORNTON

THE

SURGERY OF THE KIDNEYS:

BEING THE

HARVEIAN LECTURES, 1889.

BY

J. KNOWSLEY THORNTON, M.C.,

SURGEON TO THE SAMARITAN FREE HOSPITAL;
CONSULTING SURGEON TO THE GROSVENOR HOSPITAL FOR WOMEN,
AND TO THE NEW HOSPITAL FOR WOMEN, ETC., ETC.

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To

SIR JOSEPH LISTER, BART.,

F.R.S., F.R.C.S., D.C.L.OXON., LL.D.CANTAB., ETC., ETC.,

Professor of Surgery, King's College;

Surgeon Extraordinary to the Queen;

TO WHOSE TEACHING AND FRIENDSHIP I OWE WHATEVER SUCCESS I HAVE ATTAINED IN MY PROFESSION,

I Dedicate this Book,

WITH EVERY SENTIMENT OF AFFECTION AND ESTEEM.

J. KNOWSLEY THORNTON.

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THE SURGERY OF THE KIDNEYS.

By J. Knowsley Thornton, M.C.,

Surgeon to the Samaritan Free Hospital.

LECTURE I.

MR. PRESIDENT and Gentlemen,—My first duty to-night is to thank the Council of the Society for the great honour they have conferred upon me in asking me to deliver the Harveian Lectures, and in doing so, I can only express the hope that they, and you, who kindly support their choice by your presence, may, when I have completed my pleasant task, not regret the appointment. I have selected "The Surgery of the Kidneys" as my subject, in preference to any of the others, with which my work in London has made me specially familiar, because while the latter have all been largely written upon, both by myself, and others, with considerable experience in abdominal surgery, our subject to-night has been chiefly discussed by the general surgeon, and sometimes, with an evident bias against the abdominal methods of dealing with renal disease. It is always well to hear both sides of a question, and as we are already in possession of several able expositions of the views of those who advocate the lumbar methods in dealing with most of the surgical diseases of the kidneys, I shall offer no apology for devoting much of the time at my disposal, to an examination of the methods of treating these diseases by abdominal section.

I shall take it for granted that we all possess a sufficient knowledge of the minute anatomy and physiology of the kidneys, and I shall only ask you to allow me to remind you very briefly, of the position and anatomical relations of these organs, and of the more common abnormalities which are met with, in their position, relations to one another, and to other organs, and of the

varieties in the distribution of their blood-vessels, and excretory ducts.

In no department of surgery have greater advances been made within the last few years, than in the treatment of diseases of the kidneys; indeed, it is only within these years, that many diseases have been recognised, as being more often in the province of the surgeon, than in that of the physician.

It is in the early stages of renal disease, often exceedingly difficult, to make a correct diagnosis, and yet upon this depends the decision, as to whether the case is one for the physician, or the surgeon to treat. Here, then, as in many other diseases, the surgeon who is to do his work thoroughly and well, must also be a competent physician. This fact was early impressed upon my mind by my old friend and master, Sir Joseph Lister, who said to me, when I asked for his house surgeoncy, "You should get a house physicianship first, before you are fit to do your work as a house surgeon thoroughly;" and the more I see of surgery, the more I am convinced of the wisdom of his advice.

The kidneys are deeply placed in the loins, behind the peritoneum, in a bed of areolar tissue and fat, and on a level with the last dorsal and upper two or three lumbar vertebræ; this adipose areolar tissue completely surrounds their true fibrous capsule, and upon its healthy condition, and normal amount, chiefly depends their fixity. When it is deficient they are apt to become abnormally mobile.

The right kidney lies about half a rib's breadth lower in the abdomen, than the left; both are in health nearly half covered by the ribs, so that they cannot be thoroughly palpated from the loin, but with a moderately lax abdominal wall, the healthy kidney can frequently be distinctly felt, and a great part of its surface examined, by deep pressure from the abdominal surface.

The diagrams in the works of Morris and Bruce Clarke, showing the position of the kidneys from the front, both seem to me to place the kidneys too low as regards the ribs, making it appear that their upper borders are quite uncovered by the ribs. I show you two diagrams, modified from Tillaux and Quain respectively, in which I have given the position of the kidneys in dotted out-

line, in the position in which I have commonly found them in the living subject. Very frequently they are even more covered by the ribs than in my diagrams (figs. 1 and 18).

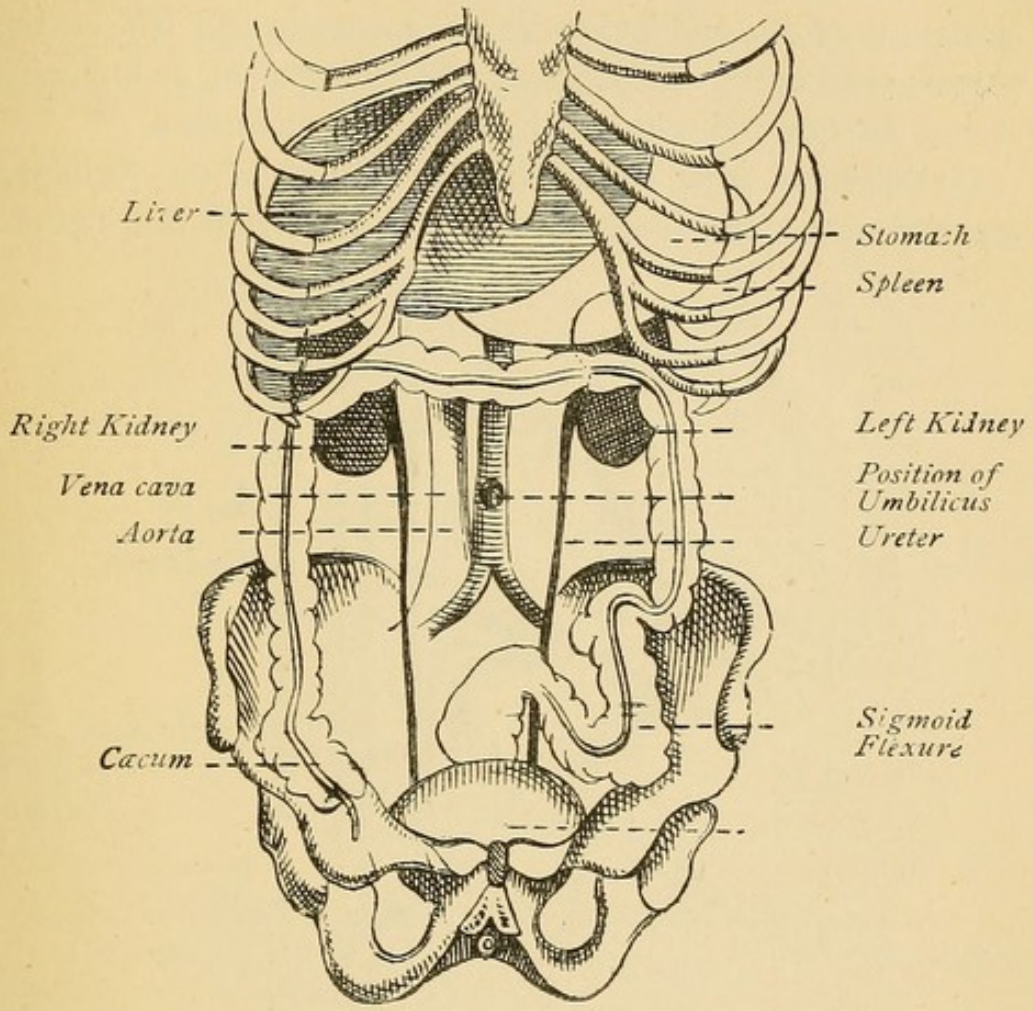


Fig. 1.
Diagram, after Tillaux, to show Position and Relations of the Kidneys and Ureters.

The other organs and structures in intimate relation with the kidneys are, on the right side, the diaphragm, the anterior layer of lumbar fascia, and the psoas muscle, the liver, the duodenum, and the ascending colon; on the left side the same structures posteriorly, with the stomach, the spleen, the pancreas, and the descending colon. The left kidney, being less covered than the right by the colon, has a larger peritoneal covering.

The fibrous tunic of the kidney is thin, and invests it closely, but can be readily stripped off in health.

The renal arteries arise from the aorta, and are relatively large for the organs they supply; the right is the longest, and passes behind the vena cava; the left vein is the longest, and passes in front of the aorta, and into it the left spermatic and left inferior phrenic veins open. Variations in the arrangement and number of both arteries and veins are, however, not uncommon.

On this figure, from Bruce Clarke's "Surgery of the Kidneys," are marked the more common varieties of arterial distribution;

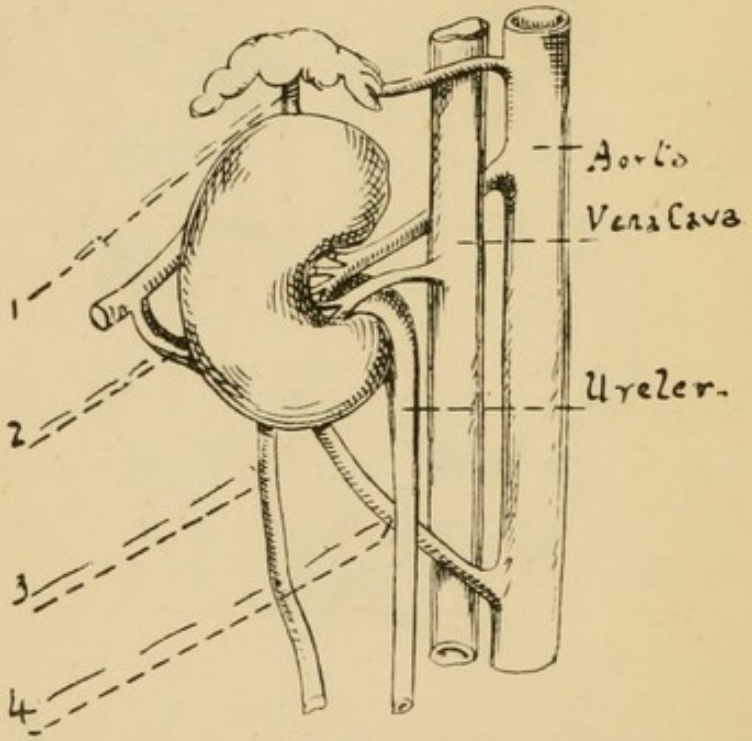
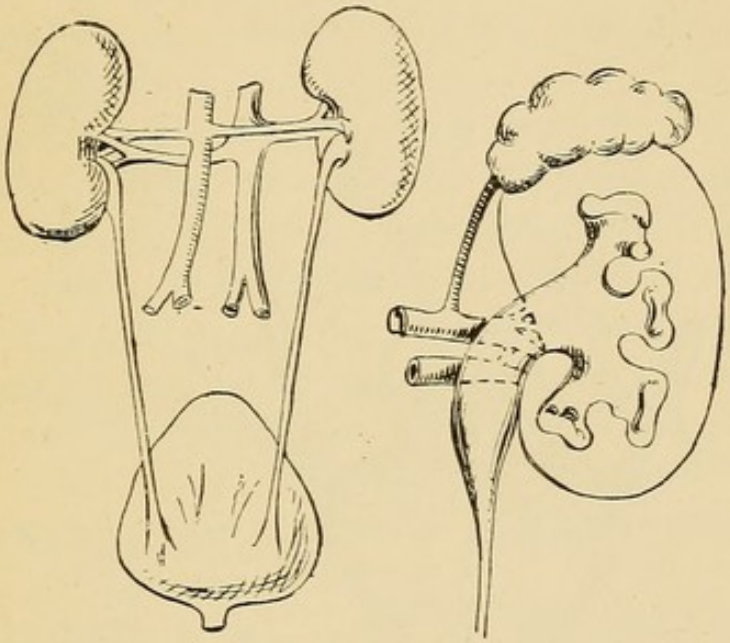


Fig. 1A.

Abnormal Branches to Kidney (Bruce Clarke).—1, Suprarenal. 2, Lumbar. 3, Iliac. 4, Aortic.

those of the veins are not so important. Both renal arteries occasionally arise from a common trunk, on the anterior surface of the aorta; additional arteries sometimes arise from the aorta, the supra-renal, the lumbar, and from either of the iliac arteries, also more rarely from the right hepatic and middle sacral. Sometimes these extra branches enter at the hilum, but they may enter

at any other point on the surface of the kidney. The normal renal arteries may give off abnormal branches to the supra-renal capsule, to the pancreas, or to the colon. It is obvious that such abnormal vessels may, when present, cause unexpected and troublesome hæmorrhage, especially in operations undertaken through the confined space of a lumbar incision; in the abdominal operation they can be readily seen and tied.



Figs. 2 and 3.

2. Kidneys, Ureters, and Bladder from behind, after Henle.

3. Diagrammatic View of Kidney from behind, to show Relations of Pelvis, Ureter, and Vessels.

The ureters pass out of the hilum, and lie immediately under the peritoneum, being very loosely connected to the parts on which they lie by areolar tissue. These are, on the right side, the psoas muscle, the genito-crural nerve, the external iliac vessels, and the side and base of the bladder; on the left side, the common iliac vessels are in relation to the ureter, instead of the external. The ureters are two inches apart where they enter the wall of the bladder, pass through it obliquely for three-quarters of an inch, and emerge by slit-like openings only an inch apart, and about the same distance behind the urethra. In the female the ureter

passes along the side of the neck of the uterus, and in the male is close to the vas deferens, before entering the bladder. There may be two ureters passing to the bladder from one kidney, or only one for both, and other abnormalities are met with, which, however, do not much concern the surgeon. The normal kidney weighs about $4\frac{1}{2}$ ozs. in the male, rather less in the female, and is 4 inches long, $2\frac{1}{2}$ broad, and $1\frac{1}{4}$ thick.

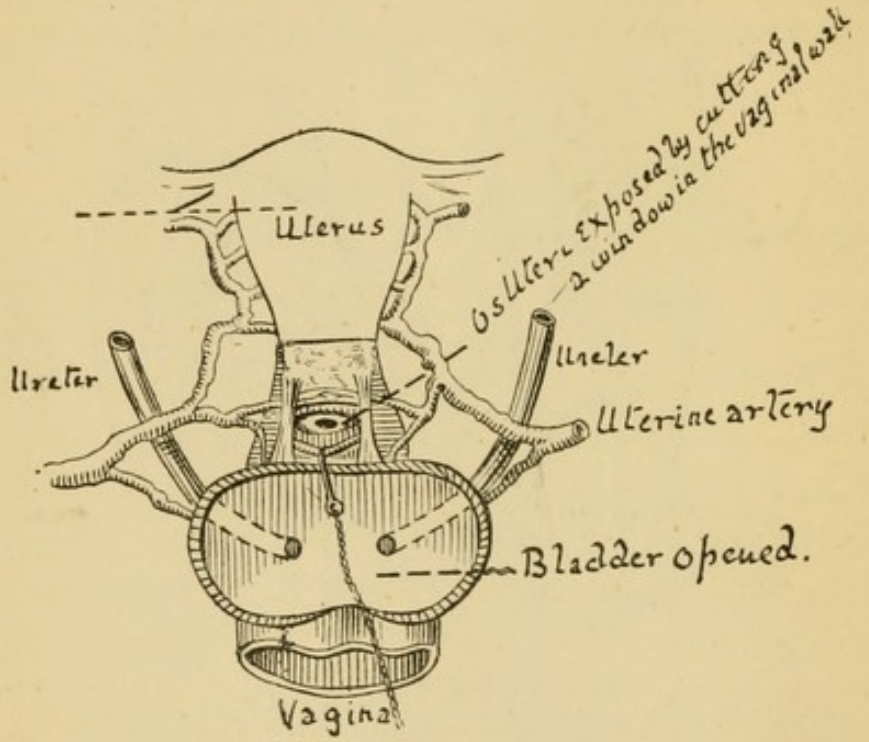


Fig. 4.

Sketch after Greig Smith, showing the Relations of the Ureters to the Neck of the Uterus at their Entrance into the Bladder.—The position of the Ureters is better in Greig Smith than in this sketch, in which they are too much curved, and hence too far from the neck of the uterus.—J. K. T.

I think if we bear the above brief sketch of the anatomy and relations of the kidneys in mind, there will be no difficulty in following the various details of the operations we are about to consider.

I will also ask you to remember, that the adipose areolar tissue in which the kidneys are bedded, is more or less implicated in all the diseases which affect these organs, and the ease or difficulty

with which each operation can be performed, is almost entirely determined, by the extent and nature of the implication of this surrounding tissue.

I place before you drawings, illustrating some of the more common abnormalities in the position and relations of the kidneys, and of their excretory ducts, the ureters.

The entire absence of one kidney,* or the complete fusion of two (the perfect horse-shoe), (figs. 5, 5A) need not detain us, as except in very rare possibilities, to which I shall briefly refer later, these conditions are, if known to exist, a complete contra-indication to operation.

The imperfect horse-shoe (fig. 6), in which the two organs are merely joined together by a web or membrane, is a much more important abnormality, as it has recently been shown to be no bar to successful surgery. In perfect fusion disease affecting one part will be pretty certain to involve the whole, but when there is a well-defined web, the one organ may be as free from disease affecting the other, as if they were entirely separate, and in their normal position. This is well shown in a specimen in Middlesex Hospital Museum, in which the one half of a horse-shoe is hydronephrotic, and the other normal (fig. 6A).

Professor Socin, of Bale, during last year, aspirated a swelling in the right hypochrondrium of a woman aged forty-seven. Obtaining urine, he performed lumbar nephrotomy, and found that it was a case of hydronephrosis; the result of this operation was parenchymatous nephritis and pyelitis. He then performed abdominal nephrectomy, and after separating the kidney from the vessels and ureter, he found that it was united to the left kidney by a thin band of renal tissue, passing over the aorta and vena cava; this he divided with the thermo-cautery; he also applied some ligatures, and sutured the edges of the capsule over the raw surface, and the patient was in good health four months after the operation.

Braun, of Heidelberg, operating for pyonephrosis, found an

* Case, Path. Trans., vol. x., p. 190, man, 45, single, right, usual situation, double size, 9½ oz., 5¾ inches by 3½; no trace of left kidney or ureter (Murchison).

isthmus uniting the two kidneys and very firmly adherent to the cava, and in separating this, had such profuse venous hæmorrhage that the patient died at the close of the operation.*

Simple Non-mobile Displacement (figs. 7, 8 and 9).†

Marked displacement of a kidney may be of the utmost importance, not only as predisposing it to certain kinds of disease, but also in relation to its differential diagnosis from disease of some other organ, which its abnormal situation may cause it to simulate, and when its position, and pathological state, have been clearly made out, its changed relations will entirely alter the plan of any surgical operation for its relief. I fear, however, the small space at my disposal will not allow me to enter at any length into such rare conditions. The left kidney is most often permanently displaced. The displacement is generally downwards into the iliac ossa, or on to the sacro-iliac synchondrosis, or the promontory of the sacrum. The supra-renal capsule may be displaced with the kidney, but more often maintains its usual position, and is quite independent of the kidney.

Floating and Moveable Kidney.

Floating kidney is essentially a congenital condition, the organ having a true mesentery, so that it becomes practically an intra-peritoneal, instead of an extra-peritoneal organ. The chief surgical importance of this condition, lies in the fact, that it may be altogether impossible to reach such an organ by lumbar incision, or, at any rate, the keenest advocate of the lumbar operation, as opposed to the abdominal, must admit that in this particular abnormality, the latter operation is the easiest and safest. Moveable kidney is not such a well-defined condition, because there are several varieties; thus the kidney with its true capsule and areolar adipose capsule may slip about under the peritoneum, or the kidney with its true capsule may be mobile inside its areolar

* *Vide B. M. Journal*, July 13th, 1889, p. 89.

† Case similar to Canton's, also left kidney, but placed just above the bifurcation of the aorta (Path. Trans., vol. xi., p. 143).

adipose capsule, generally from deficiency of fat in this latter covering; or again, there may be no anterior peritoneal covering, and the kidney may slip about between processes of the peritoneum. I would recommend those who wish thoroughly to understand the varieties which may be met with to read the exhaustive chapter on this subject in Dr. Newman's lectures to practitioners, on "Surgical Diseases of the Kidneys."

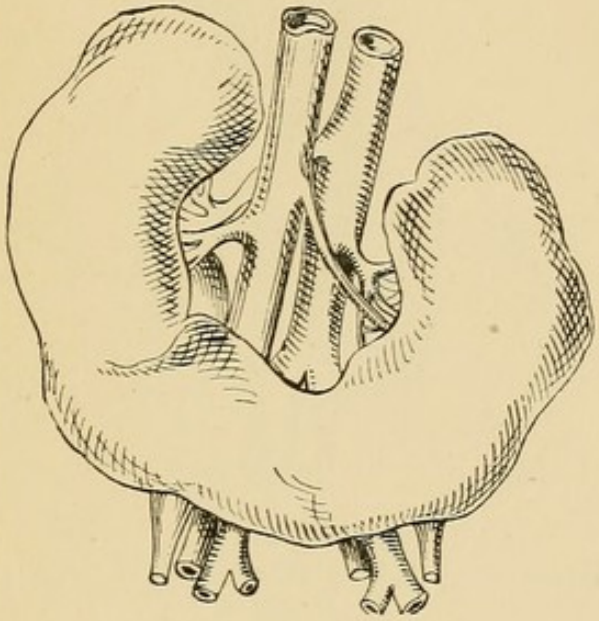


Fig. 5.
Horse-shoe Kidney, after Bruce Clarke.

Etiology.—A deficiency in the adipose tissue is the chief predisposing cause. Sometimes this is a normal condition; sometimes it is acquired. My own observations lead me to conclude that the kidney may be shaken from its place by a series of severe jolts and jars, as in rough riding, and also by constant action of the feet and legs when the person is bending forward, as in working a sewing-machine. I have seen several cases in which the first displacement seemed distinctly to be traced, to one or other of these causes. Of course, in a thin and weak person such a cause will act more decidedly and quickly, than in a strong one, and in the relaxed condition of the abdomen after pregnancy the kidney is very

likely to slip from its normal position, and become unduly mobile. The views of various observers as to the cause of moveable kidney differ greatly, but there is probably some truth in most of the theories advanced. It is an undoubted fact that the right kidney is much more often unduly mobile than the left, that women are more subject to the disease than men, and that it is more common

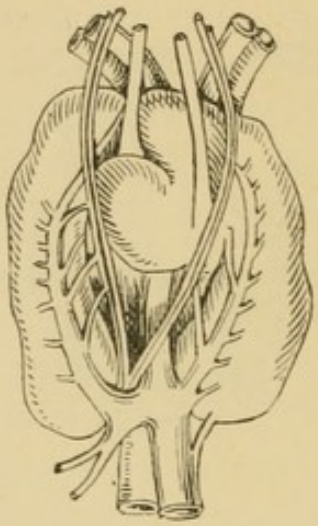


Fig. 5A.
Horse-shoe Kidney Misplaced (H. Morris).

in the former sex in those who have borne children. The greater length and freedom of the vessels on the right side, and the downward pressure of the liver, have been thought to account for the greater frequency of the condition on this side, the vessels on the left side being not only shorter, but more fixed by their connections with the pancreas; others dwell upon the looser attachments of the colon on the right side. The increase and decrease in the size of the pregnant uterus, with the consequent changes in abdominal pressure, the greater vascularity of the kidney during gestation and menstruation, and the drag on the ureters from displacements of the uterus and ovaries, are again, thought to account for the greater frequency of the condition in women.

Pathology.—The displaced kidney may be but little affected structurally for a long time, but it is generally abnormally sensitive,

and the patient has a constant sense of some weakness, which makes walking and standing difficult; and in time the escape of the urine is interfered with, and hydronephrosis, to be considered later, may be produced. Torsion, either of the ureter or of the vessels, may cause uræmia.

Symptoms.—These are the sense of weakness, weight, and discomfort, chiefly in the loin on the affected side, the presence of a moveable lump in the abdomen, which can be felt to descend from

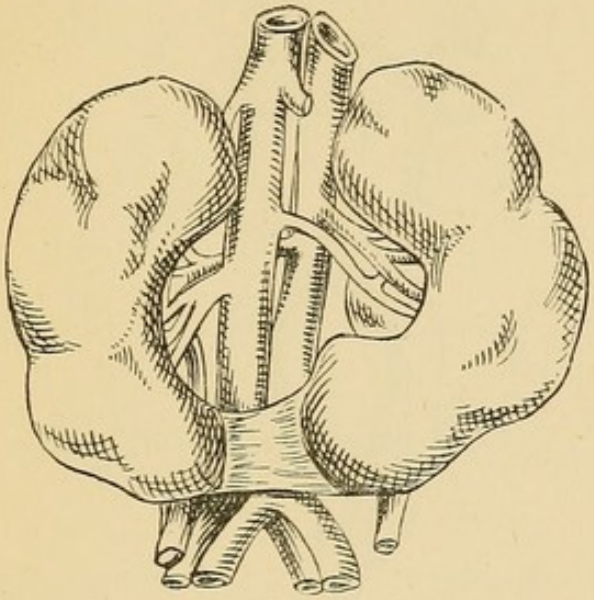


Fig. 6.
Horse-shoe Kidney with Membranous Union (after Bruce Clarke).

under the ribs when the patient stands up, or turns on to the opposite side in bed, and to slip up again on pressure, or on assuming the dorsal recumbent position. There are also frequently present severe gastric and neurotic symptoms. Women with mobile kidney are usually excitable, hysterical, and easily depressed. When the patient stands up, or lies completely over on the face, the dull area in the back will be absent in marked cases.

Treatment.—I have found a truss which is made by Mr. Hawksley, a great comfort in some cases. Others derive more benefit from a simple spiral elastic bandage, and in one case a half-moon-

shaped pad, worn inside an ordinary abdominal belt, gave great relief.

As in other surgical procedures, opinions differ greatly, as to whether it is proper to operate in these cases. I think there can

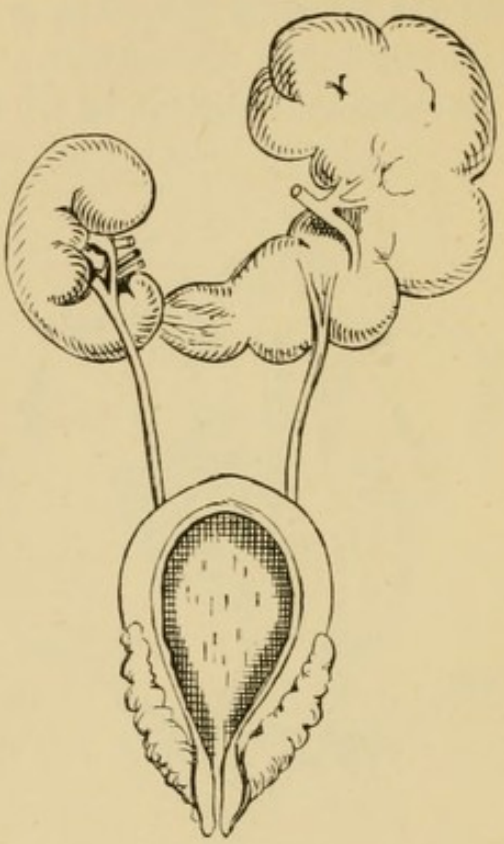


Fig. 6A.
Hydronephrosis in Horse-shoe Kidney (H. Morris). Specimen in Middlesex Hospital Museum.

be no doubt that the removal of a kidney simply because it floats, or is mobile, is quite unjustifiable, but I think that the suturing of the kidney (nephrorraphy) into its proper position is in extreme cases quite a proper proceeding, and it has been attended in my own hands, as in those of many others, with marked benefit, and I am not aware that the operation has ever had a fatal result.

The recent debate on Renal Surgery at the Leeds meeting, as reported in the *British Medical Journal* last week (November 16th), brings out the difference in opinion strongly. Morris says, "Nephrorraphy in the treatment of moveable kidney has proved

very successful in its ultimate results, as well as in the readiness of recovery from the operation."

Newman: "In all the cases in which I have operated the result has been most satisfactory. There are some writers who deny the efficiency of this operation, but this most surely arises either from want of experience or from prejudice."

Tait: "I have been persuaded to perform three of these useless

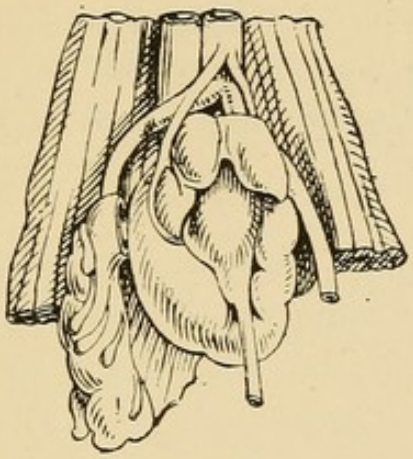


Fig. 7.
Single Misplaced Kidney (Canton).

and unscientific operations, with the result that not one of the patients have been benefited in the least, and one of them has died under such circumstances that I think the operation might fairly be blamed for it. I shall have nothing more to do with fixing kidneys."

Bruce Clarke advocates "its judicious application in those instances where severe pain was suffered on account of moveable kidney. The balance of opinion and good results are clearly both in favour of the operation, when carefully performed, in suitable cases."

Nephrorraphy

is an operation for causing adhesions between the kidney and the structures surrounding it, this end being, as the name indicates, generally secured by suturing the kidney, or its capsule, to the tissues incised in exposing it. The operation is

simple enough, and if aseptically performed should be free from all risk, but unfortunately in these aseptic cases the sutures do not set up enough irritation to permanently fix the kidney. This difficulty has, however, been successfully combated by Gould, who employs kangaroo tendon for the sutures, leaving them in permanently.* I found the ordinary silk sutures, deeply passed into the substance of the kidney, and left in for a fortnight, answer admirably in one case, but I must confess to some anxiety as to the after-result of the procedure, on those portions of the secreting tissue of the kidney included in the three loops I used. I think it is a good plan to thoroughly stir up the areolar adipose tissue over a considerable surface, and put in several thick red rubber drainage-tubes, so as to obtain the maximum of aseptic irritation.

I have under my care a lady who has both kidneys moveable, and both as a result hydro-nephrotic. One I opened, and drained through the loin with great relief to her suffering, and complete restoration of general health, but a fistula persists, and all attempts to close it cause a return of serious symptoms. The other kidney has ceased to be troublesome, as the result of improved general health, and increase of flesh, but it was undoubtedly kept in place, to the great comfort of the patient, by one of Hawksley's trusses, while its natural packing was being formed.

The oblique incision usual in lumbar colotomy, only rather higher up, answers well for exposing the kidney in this operation. Some operators incise the capsule and stitch the two cut edges to different parts of the external wound, but I do not think this is either necessary, or advisable. In some exceptional cases it might be well to open the abdomen, in order to get a more perfect command of the kidney, and a more exact application of the fixing sutures, but in the majority of cases this is certainly one of the renal operations which may be as well performed from the loin, and probably more safely, as the abdominal section would have to be supplemented by some amount of lumbar section, for the introduction of the fixing sutures.

* *Lancet*, Oct. 6th, 1888, p. 674.

Hydro-nephrosis.

Distension of the kidney with its own secretion, from some obstruction to the escape of the urine, is, as I have said, an occasional result of undue mobility of the organ, and we may therefore conveniently pass on to the consideration of this condition.

Etiology.—Obstruction to the escape of the urine may occur at any point between the renal opening of the ureter and the meatus urinarius. It is most commonly somewhere in the ureter. Many cases are congenital, the ureter being abnormal in structure, or in anatomical relation to the kidney. I show you here a kidney which I removed from a girl aged seven, in which no trace of the ureter could be found. It was my first nephrectomy, and the child rapidly improved in health, and remains well. In other cases it is an acquired condition, due to some congenital abnormality in neighbouring parts, which in time interfere with the passage of the urine. Bands and adhesions, displacements of the kidney, or of other abdominal organs, and the presence of abdominal and pelvic tumours are among the causes, but calculus is the most common cause of the unilateral variety, with which surgery is chiefly concerned. Cancer in the pelvis, and affections of the bladder and prostate, most often cause bilateral disease, and do not often afford opportunity for surgical aid.

Pathology.—The whole kidney may be affected, or only some portion of it; usually the pelvis is first dilated, then the calyces, and finally the secreting structure. The fluid in an advanced stage, frequently contains neither urea nor uric acid, but is watery, with a little salt, and a trace of albumen; later it may contain blood, or become pyoid, producing one variety of pyo-nephrosis, the next disease to be described.* The internal pressure of the accumulating urine, as pointed out by Newman, acts both as a cause of more watery secretion, and also by stopping the circulation in the blood-vessels. The cases in which large abdominal tumours are formed, are those in which there is some escape of urine, the secreting structure being then irritated by the alternate expansion and contraction of the organ. In the more

* Note Path. Trans., vol. xiii., Goodfellow.

permanent cases the secreting structure is paralysed, and the fluid may be reabsorbed, and atrophy of the kidney take place.*

Symptoms.—Often there are no symptoms till a tumour is discovered, or the patients suffer from an indefinite ache or pain which is not traced to the kidney; but in bad cases there may be uræmic symptoms, or colic, which will be more especially con-

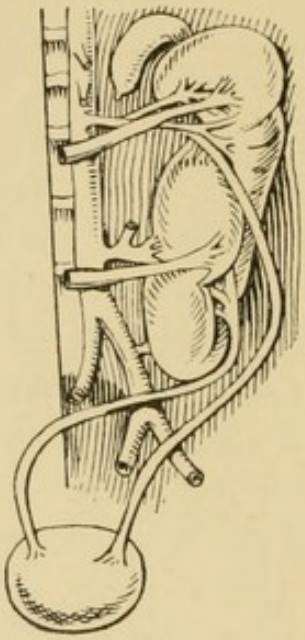


Fig. 8.
Fusion of two Kidneys (Virchow).

sidered when we come to renal calculus. When a tumour appears the case has probably been long progressing, with proportionate damage to the secreting structure. The tumour may be round, or lobulated, or oval, and will fluctuate, though this latter symptom is often very difficult to make out. Perhaps the most certain symptom is the occasional disappearance of the tumour, with increased flow of urine.

Diagnosis.—This is not always easy; retro-peritoneal, omental, and mesenteric cysts are especially difficult to differentiate from hydro-nephrosis, and it has been a common error to mistake an

* Cases, Path. Trans., vol. viii., p. 280, Sidney Jones; vol. x., p 209, Quain; vol. xiii., p. 145, Goodfellow.

ovarian cyst for a hydro-nephrosis, or *vice versâ*. It is also in some cases difficult to distinguish between hydro- and pyo-nephrosis.

The position of the colon, curving across the tumour, is one of the best diagnostic points in renal tumours, giving a clear note on percussion over their inner border. Sometimes this is lost through the intestine being contracted and empty, but even then it can often be defined as a raised cord, which varies in shape under pressure. In very large tumours the bowel sometimes gets

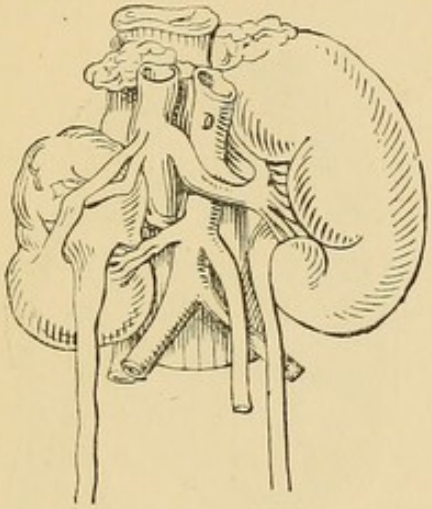


Fig. 9.
Misplaced Kidney (Bruce Clarke).

behind, and this sign is altogether lost. I have seen some retro-peritoneal cysts, which it was quite impossible to distinguish from hydro-nephrosis, till the abdomen was opened, and in one case I did not discover what the tumour was, till I had enucleated a considerable portion of it, so exactly did it simulate a distended adherent kidney.

There should, however, be no difficulty in differentiating a hydro-nephrosis from an ovarian cyst, and yet they are frequently mistaken for one another. In the former there is the position of the colon, the dulness going far back into the loin and under the ribs, and nearly always a clear line between the lower edge of the tumour and the iliac crest. In the ovarian cyst the dulness and

fluctuation rarely go so high, and so far back, and though its upper margin is often overlaid by clear intestine, there is not the same fixed curve of clear note, and the dulness extends down to the iliac crest and pubes. The ovarian cyst has usually more lateral mobility than the renal cyst. The pelvic examination alone will usually distinguish the one disease from the other. The hydro-nephrosis rarely becomes pelvic ; the ovarian tumour is nearly always more or less so. If the lower part of the hydro-nephrosis does enter the pelvis, its close connection with the bladder can be traced,

Fig. 10.
Hydronephrosis and Double Ureter (Bruce Clarke).

while pressing up its abdominal portion does not affect the uterus, the exact reverse being the case for the ovarian cyst.

Careful aseptic puncture far back in the loin, and examination of the fluid removed are, however, the only certain means of diagnosis, at any rate in many of the cases.

Treatment.—I have alluded to puncture as a means of diagnosis ; it may also be tried as a means of treatment, before proceeding to any more serious operation. I have never cured a case by puncture, and I do not find in the literature of the subject, any good evidence that cures are often so effected. Of course

all congenital cases, and others in which the obstruction is complete, are out of court, and it is only in some few cases in which a stone may pass after the pressure behind it is relieved, or some other temporary obstruction is removed, that puncture can be curative.

Puncture should be performed with the aspirator, the needle being introduced far back in the loin, to avoid risk of puncturing the colon or peritoneum, or of allowing extravasation of urine into the latter cavity. The skin round the point of puncture, and the needle and trocar, should be carefully purified by a watery solution of corrosive sublimate, or other powerful antiseptic, and great care should be taken to avoid the entrance of air, as the trocar is withdrawn from the empty cyst.

If sufficient relief is obtained by puncture to warrant the hope that the obstruction may be relieved, the operation may be repeated from time to time, especially if the intervals during which the kidney remains contracted lengthen with each puncture.

If, on the other hand, as is usually the case, the fluid rapidly reaccumulates, some more radical operation must be undertaken. Incision and drainage have been so warmly advocated that I have tried them in two cases, which seemed to me suitable, but in both they have completely failed, and the patients are exposed to the misery of wearing a tube constantly in the sinus, and a receptacle for collecting the urine. Whenever the tube is blocked, or removed, distension recurs, with pain, and constitutional disturbance; both patients are, however, in decidedly better health than before the operation.

Nephrectomy is the other alternative, and I believe that it is the proper treatment in all cases which do not improve after one or at most two tappings. Very large tumours I would not attempt to cure by tapping, but would perform nephrectomy by abdominal section at once. I shall not now describe this operation, as I think it will save time to consider the various diseases for which the operation may be necessary, and then discuss the operation, and the best methods of performing it for each disease, all at the same time.

Morris, who was till recently an advocate for repeated tappings,

has now changed his opinion. In the debate above referred to he says, "The results of this treatment have, however, been disappointing, for the tapping has had to be again and again repeated, and nephrotomy has been frequently followed by a urinary fistula in the loin."

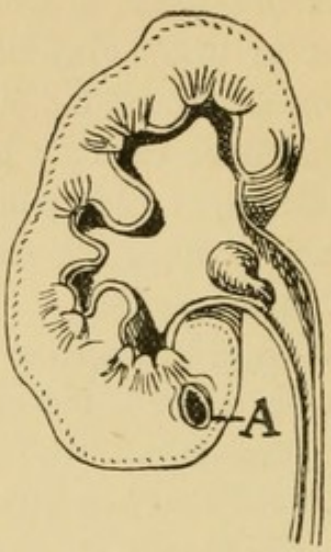


Fig. 11.
Kidney, with Stone in Pelvis and another in Cortex at lower end Pelvis dilated; Cortex thinned.

Pyo-nephrosis

is a similar distension of the kidney, with purulent urine, or pus alone.

Etiology.—It commonly results from suppuration in an old hydro-nephrosis, also from tubercle, calculus, or injury. It can only occur from the introduction of pyogenic organisms into the kidney, and is most commonly the result of careless catheterism. It must not be forgotten, however, that the kidneys are the great excretors of septic organisms, hence suppuration may occur in them, without direct external agency.

Pathology.—It is obvious that when pus formation is added to simple dilatation, the pathological results will be proportionately severe. Thus we get inflammation and suppuration spreading into the secreting structure, and involving also the capsule, and

circum-renal tissues. This involves not only destruction of the secreting tissue, but cicatricial changes in the surrounding adipose tissue, which add greatly to the difficulties to be encountered in giving surgical relief.

Symptoms.—These are those which are common to all suppurations, fever, anorexia, and chills or rigors, together with the appearance of pus in the urine, and the presence of a tender loin-swelling, varying in size. Frequently there is rapid enlargement of a pre-existing loin tumour, and disturbance of the peritoneum. To these may be added at any moment the symptoms of septicæmia, or of uræmia, from sympathetic suppression of the secreting function in the opposite kidney.

Diagnosis.—This is easier than in hydro-nephrosis, because the symptoms are more severe, and more localised to the affected organ, but in a chronic case in which the pus only passes occasionally, the differential diagnosis between the two is by no means easy.

Treatment.—This will vary according to the cause and extent of the pyo-nephrosis. Simple pyo-nephrosis, resulting from injury, from the transformation of hydro-nephrosis, from the earlier stages of tubercle and scrofula, and from the presence of calculus, may all be successfully treated by incision and drainage, combined in the latter variety with the removal of the stone. This operation may be more conveniently dealt with when I describe the operation of nephrotomy and its various applications. I may, however, give brief notes of a case which well illustrates pyo-nephrosis due to injury, and its cure by incision and drainage.

In July, 1887, I was called to Dublin, and saw, in consultation with my friends Dr. Little, and Professor Thornley Stoker, a gentleman about forty-five years of age, a member of our own profession, who had served in India, and suffered from fever and enlarged spleen. In 1886, while at home on sick leave, sailing in a small yacht, he was struck by the boom on the left side, his arm was fractured, and the elbow was driven violently against his side. Pain in the abdomen and rigors followed, and pus appeared in the urine. Shortly before I saw him a considerable tumour had formed in the left loin; the pus amounted to fully a third of the

urine passed, and was occasionally mixed with blood; he had emaciated much, was very weak, and had a sallow, earthy colour, quick pulse, and irregular temperature. I found a large fixed and fluctuating tumour, in the situation of the left kidney. The examination of the tumour, and his general condition, made me advise lumbar incision and drainage, in preference to abdominal section with a view to nephrectomy, which had been suggested. This operation was performed, a large quantity of pus evacuated, and I satisfied myself that the pelvis of the kidney had been opened. Rubber tubes were introduced, and the wound treated antiseptically, and thanks to the care bestowed upon the patient, after my departure, by Professor Stoker, he made an excellent recovery. I examined him six months later, and found that the kidney had regained its proper size, and that the urine merely contained a trace of albumen, and an excess of renal epithelium.

This is, however, a favourable result, upon which we cannot often reckon. In advanced cases, when there has been much destruction of the secreting structure of the kidney, and extensive inflammatory changes in the tissues around the organ, nephrotomy and drainage are very likely to end in prolonged suppuration and a urinary fistula. Morris, who was at one time a strong advocate for incision and drainage, now advises against their employment "in cases in which it is probable that nephrectomy will, in the long run, be requisite or desirable."

Pyelitis

is suppuration in the pelvis of the kidney. It is included in pyonephrosis, and may be best discussed under the calculous, the tubercular, and the scrofulous conditions which most frequently produce it.

Pyelo-nephritis

is an inflammatory suppuration involving the whole kidney, and is a result of some disease of the pelvic urinary organs, and commonly known as "surgical kidney." It nearly always involves both kidneys, and is not susceptible of surgical relief, so that it need not detain us.

Renal Abscess

is a collection of matter in the tissue of kidney.

Etiology.—It may arise from injury, calculus, spread of suppuration from neighbouring parts, or from the administration of some drug specially obnoxious to the kidney.

Pathology.—It is limited in extent, usually occurs in only one organ, and arises from some of the above-named causes, so lowering the vitality of a portion of the renal tissue that the pyogenic cocci, which are probably always present, are enabled to develop.

Symptoms.—Those of acute suppuration, with renal pain, and possibly renal tumour, though this may not be, at any rate in the early stages, easy to detect.

Diagnosis.—This must depend on the presence of a known cause, the severity of the constitutional symptoms, and their coincidence with renal pain, or other sympathetic renal disturbance.

If the matter does not find its way into the pelvis of the kidney, and down the ureter, and the physical signs are obscure, exploratory puncture may be employed, to be followed by free incision and drainage, when the exact situation of the abscess is made out. Such incision should of course always be made in the loin, and its exact method of performance will be described under Nephrotomy.

Perinephric Abscess

is a collection of matter in the tissues immediately surrounding the kidney. It is very often diffuse, spreading in the subperitoneal cellular tissue and the sheaths of abdominal and retroperitoneal muscles.

Etiology.—It is most commonly caused by extension of suppuration from within the kidney, in advanced tubercle or very old cases of calculus. It may also arise from direct external injuries, and is, I regret to say, in these days not uncommonly the result of the improper use of the exploring needle and trocar. I shall have to refer to this subject again when speaking of puncture of the kidney.

Symptoms.—These are those common to all acute suppurations,

with the addition of renal symptoms, according to the extent to which the kidney is involved. The treatment is, of course, free incision and drainage.

Calculus.

Gravel and calculus are the most common cause of all the diseases we have been considering, but though they are usually the cause, they may be also in some instances the effect, being induced by the retention of the urine too long in the kidney, as in moveable kidney, and in hydro-nephrosis which results from some abnormality in the ureter. The presence of stone in the kidney, and the possibility of its removal by lumbar incision, have been known since the days of Hippocrates, but it is only during the last few years that the operation has been recognised as the proper treatment for most cases of renal calculus. In 1869 Mr. Thomas Smith read before the Medico-Chirurgical Society an admirable and suggestive paper, on the method to be employed in removing a stone from the kidney. In 1878 I attempted to carry his suggestions into practice, but was mistaken in my diagnosis, and only gave exit to a quantity of tubercular pus, with great relief to the sufferings of the patient. Two years later Dr. Coupland recommended the operation to a patient under his care in the Middlesex Hospital, and his colleague Mr. Henry Morris successfully removed the stone, and established the lumbar method of operating.

I have performed the operation thirteen times with but one death, that of an elderly Frenchwoman, whose kidneys secreted no urine after the operation.

Renal calculus is most common in the young, and after fifty years of age, urate of ammonia and uric acid being, according to Taylor, the most common nuclei in the respective periods. The oxalate or mulberry calculus, though not so common, is undoubtedly the one which causes the most severe symptoms and sufferings. I have placed on the table, a number of the calculi I have removed by nephro-lithotomy, and by nephrectomy.

It is impossible to describe even briefly all the varieties and their special pathology, but fortunately they are all, if not left too long, susceptible of surgical cure by incision and removal.

Calculus may be single or multiple, may occur in one or both kidneys, and in any part of the organ, though most commonly in the pelvis, or in one of the calyces. It may be small, and fixed in the renal tissue, or acting like a ball-valve to the pelvic opening of the ureter, or large and smoothly coated with phosphates, filling and distending the kidney (such a stone I show you here, No. 6 in my Nephro-lithotomies), or branched and extending from the pelvis through the various openings into the calyces; these latter are rarely suitable for extraction, as they break easily and portions are very likely to be left behind (see Nephrectomy, 23). Lastly, there may be many small stones, or several of considerable size, with smooth facets from mutual friction. With such variety in number, situation, shape, and size, it is obvious that great ingenuity and a variety of instruments may be necessary for their successful extraction.

Symptoms.—Pain in the loins and back, often shooting down the ureter, into the testicle in the male, and into the ovary in the female, and into the hips, thigh, and knee, aggravated by motion, especially if it be of a rough or jolting kind; tenderness on pressure over the affected kidney; hæmorrhage, which is especially liable to follow such rough movements, the urine when passed being either smoky, bright red, or coffee-coloured; and the presence in the urine of crystals, or of small fragments of the calculus, are the most common and important symptoms.

In more advanced cases the presence of pus in the urine, with irritability of the bladder, especially at its neck just after the act of micturition, are also common.

To these local symptoms must be added a number of reflex phenomena, especially disturbances of the digestive organs, indigestion, nausea, retching, vomiting, and flatulence. The latter, being often markedly troublesome in the colon on the affected side, sometimes amounting to actual intestinal colic, is in my experience one of the most common and early symptoms in the majority of cases, and is one which is very apt to be overlooked, or misunderstood. Intestinal colic frequently precedes, and is apt to mask, the true renal colic, caused by the passage, or attempted passage of a stone down the ureter.

It must be borne in mind, however, that most of these symptoms may be present in a case in which no stone can be found, and they may be markedly and constantly referred to one side, whilst the stone is in the kidney on the opposite side—a sympathetic transference of pain from a diseased organ to its fellow, which I had frequently observed in the ovary, before I had any experience in renal surgery.

In order to fix on your minds these two important facts, (1) presence of all the most important symptoms without a stone, (2) transference of pain from the affected to the healthy organ, I will read brief notes of two remarkable illustrative cases which have occurred in my own practice.

In June, 1888, I was asked by the late Mr. Walter Coulson to see with him a young lady whom he believed to be suffering from renal calculus. She gave the following history: In February, 1875, scarlet fever; a chill soon after recovery was followed by frequent passing of gravel, with much pain in the back. In June, 1876, passed a small stone; other small stones were passed at varying intervals till July, 1884. Has passed no more stones, but has suffered constantly from a dull heavy pain in the left loin and back, with frequent attacks of acute cutting pain, reaching through into the left groin, accompanied by very frequent micturition, with pain and difficulty. In 1887 was said to have had an abscess in the left kidney, the pus passing off in the urine. From this time blood was more or less constantly passed, the quantity varying from a few drops to several ounces. Early in 1887 she first saw Mr. Coulson, and he continued to treat her till I was called in, but without relief. When I saw her the bleedings were frequent and severe; she was suffering from constant nausea and frequent vomiting, could not walk more than a few yards, passed water frequently in small quantity and with difficulty, and I found it full of uric acid crystals, some of considerable size.

Here, then, we seemed to have a typical case. I operated upon June 18th by a method which I shall afterwards fully describe and discuss; could detect no calculus from the peritoneal examination, none on opening the capsule and carefully palpat-

ing the whole kidney, none on opening the kidney through the loin and carefully exploring its whole interior.

She made an excellent recovery, and on the anniversary of the operation wrote to me as follows: "I have had no return of the pain and other symptoms, and am now fairly strong, better than I have been for years, and can walk two or three miles without being very tired."

The only possible explanation of such a case is, that the results of the original mischief remained after the stones had passed, and that nature was unable to put the kidney right, free incision, and possibly the breaking down of internal inflammatory deposits with my exploring finger, being necessary to set up healthy reparative action. I altogether dismiss the suggestion that the stone was small and escaped without our noticing it, because every particle of clot was washed and examined, and everything that had been used most minutely inspected, before anything was taken out of the operation-room. Besides, there are other cases which show that the symptoms may be present without a stone, though I know of none so perfect in all its details, and in its after history, as the one I have briefly given you.

The following case, illustrating the transference of pain, and the most typical of several that I have observed, is even more remarkable:—

In July, 1886, I was asked by my friend Dr. Geo. Johnson, to see a little girl, aged eleven, the daughter of a medical man, whom he believed to be suffering from renal calculus, and needing operative relief.

The patient was fair, thin, and very delicate-looking. On examining her I could detect a large right kidney, but could not define the left at all. All her symptoms were on the left side, and I concluded, as had Dr. Johnson before me, that the left kidney was practically destroyed, and that there was compensatory enlargement of the right one.

History.—Two years ago the urine was noticed to be full of "white slimy stuff," which disappeared under treatment, but reappeared at Christmas, 1885, when she also passed red sand and blood. Just six months before I saw her she had her first attack

of left renal colic ; other attacks followed—one in February, two in March, one in April, two in May, and a very severe one towards the end of June. All were typical of left renal colic, no pain or uneasiness ever being complained of in the right side.

I fully agreed with Dr. Johnson that it was a proper case for operation, as did Dr. Coupland, who had also seen the child, and who was present with Dr. Johnson at the operation. Dr. Johnson also agreed with the reasons which I urged in favour of my combined abdominal and lumbar operation, to be hereafter described, being adopted in preference to a simple lumbar incision.

On August 4th, 1886, Mr. Murray administered chloroform, and assisted by Mr. Malcolm, I made the usual lateral abdominal incision over the left kidney. The most careful examination failed to detect anything wrong either with the kidney or ureter, beyond a few minute superficial cysts on the surface of the former. I therefore passed my hand across to the other side of the abdomen, and found that the enlargement of the right kidney which we had detected, was due to its pelvis and calyces being packed with these large stones, which I show you. I made my usual loin incision, and removed them.

The patient made an excellent recovery, and remains in good health, having no further trouble in her left side, beyond a very short attack of colic just when she first began to move about, probably due to some stretching of adhesions in the right side. Concerning this single recurrence, her father wrote, that during the attack she would not admit to pain over either kidney or ureter, but that when it had passed off next morning, she was distinctly tender on pressure over the *left* loin. Did time and space permit, I could give you notes of other cases, in which this transference of pain is quite distinctly shown by the unfailing test of operative examination.

Sometimes a careful examination, by combined lumbar and abdominal pressure, will reveal the actual presence of a stone as a hard projection from the surface of the kidney, but this is only possible when the stone is large, and the patient thin, with a lax abdominal wall. When all the symptoms of stone are

present the patient bears deep palpation badly, and is apt to throw the deep muscles into hard prominences which are very deceptive, so that I am always sceptical about the detection of a renal calculus by palpation.

Needling.

The presence of a stone in the kidney may in some cases be verified by striking it with a fine strong needle, introduced into the kidney from the loin; this method finds favour with some surgeons, but I have never employed it. The needle may have to be introduced many times before the stone is struck, and I cannot but think that this proceeding is one which must be attended by a good deal of immediate risk, and with considerable danger of after ill effects. There must be danger of wounding some of the larger vessels, or of transfixing the kidney, and passing the needle into the bowel or peritoneum. And if many punctures are made it seems probable that they may become centres of degenerative change in the secreting structure of the kidney. The essence of good surgery, to my mind, is to see exactly what we are doing; hence needling would not commend itself as a scientific proceeding, even if safe, and much more certain in detecting the stone than it has at present proved in the hands of its advocates.

Pain, especially tenderness on pressure, hæmorrhage, and renal colic are on the whole the most reliable symptoms, but they may all be present in tubercle and malignant disease; so that the positive diagnosis of calculus is frequently impossible without an exploratory incision.

Hæmorrhage is a very important symptom, and is usually worse during the day and during movement, while it is less at night when the patient is at rest. Newman states, that the hæmorrhage in cases of tumour and malignant disease, more often occurs when the patient is at rest in the recumbent position, but I do not know on what grounds he makes the assertion, and I have not been able to verify it by clinical observation.

Another important symptom which may aid in distinguishing calculus from early tubercle, is the appearance in the urine of a

quantity of mucus; this is often present with calculus, even before there are any other very decided symptoms.

Renal Colic.

This is so important, not only as an indication of the presence of calculus or of some abnormal substance attempting to pass from the pelvis of the kidney along the ureter, but also on account of the important pathological conditions of which it is often a forerunner, that we must devote special care to its consideration.

The pain which we call colic, is due to the violent spasmodic contractions of the ureter upon the foreign body, which it is attempting to expel, and will vary in severity according to the size, to the hardness, and to the roughness of this body. Thus a clot, a small hydatid, or a small, smooth, oval calculus will give rise to a very different amount of pain, from the passage of a rough round calculus, or of a sharp angular fragment. The pain will in these latter cases be also much more prolonged. The greater the resistance to the passage of the foreign body, the greater the pain, and the longer its continuance. The severity of the pain and the length of its continuance are also, to a great extent, an index of the amount of pathological change, which will result. Two forces act in expelling a foreign body from the ureter—the pressure of the accumulating urine from behind, and the contractions of the ureter itself; these two forces are, however, very apt to come into direct antagonism. The urine, forcing the foreign body along the ureter, causes pain by distension, and also by scratching the delicate mucous membrane; if the body has a rough surface the result is involuntary muscular contraction, which grips the foreign body, narrows the channel below it, and thus delays its passage, and increases the pain of its expulsion, or brings it to a complete standstill, till relaxation of the muscle occurs, either from the paralysis of long-continued effort, or from the pain being diminished by exhaustion of the nerves. The indications for treatment during the attack are to place the patient at rest, the parts at rest by raising the shoulders and knees, the secreting function at rest by the hypodermic injection of morphia, and the

spasmodic contractions at rest by combining atropine or belladonna with the morphia, while hot applications to the abdomen will also soothe the irritated nerves. The above drugs have also a most important general action in allaying pain and soothing the nervous system. The hot bath, or hot air bath, given while the patient reclines in bed, are also useful.

So severe and prolonged is the agony of a bad colic, that convulsions may result, the pregnant woman abort, and the patient, even when a strong man, grovel on the floor, biting and clutching at anything within his reach.

The attack is usually sudden, though some patients have ill-defined sensations which warn them of its approach; often it is ushered in by a rigor, during which the temperature may rise very high, with violent retching and vomiting, then heavy perspiration, quickly followed by coldness, clamminess, and collapse; there is constant desire to empty the bladder, though little or no urine is passed, and the act of micturition is a source of severe pain in the neck of the bladder, or at the end of the penis; in the males too, the testicle on the affected side will often be violently and painfully retracted. I have not met with a case of retraction of the opposite testicle, though I suspect this sometimes happens. The opposite kidney may be excited to free secretion, or complete suppression may come on. It is obvious that the pathological results may be, and often are, very serious, especially when the attacks are frequent, or of long continuance; the renal tissue is stretched and injured by the distension of the pelvis and calyces, and the ureter is stretched and damaged by the violent contractions on the hard and rough or sharp edges of the calculus. Then if the stone does not pass down or slip back into the pelvis, but remains fixed in the ureter, hydronephrosis and gradual destruction of the secreting tissue of the kidney follow, or the other kidney may sympathise to such an extent that fatal suppression and uræmia supervene, as in the very interesting and instructive case recorded by Godlee, in the Transactions of the Royal Medico-Chirurgical Society, vol. lxx.

It is not uncommon for the stone to become fixed in the ureter, just at its entrance into the bladder wall. I have met with

two such cases, and in one in which the kidney had become pyonephrotic and disorganised I removed it, and left the stone with a perfectly successful result. In the other I removed the stone by dilating the urethra, and cutting it out through the bladder, but a ureteral fistula resulted, and the urine was discharged into the pouch of Douglas. The patient, a woman of weak intellect, went out of her mind, became quite unmanageable, and died of exhaustion a fortnight after the operation.

Calculous Suppression of Urine.

There is sufficient evidence to prove that this can arise from the blocking of one ureter, the opposite kidney and ureter being quite healthy. It is therefore necessary, in such a case, if we are to save the patient from impending death, to decide, and to decide quickly, whether both ureters are blocked or only one, and if the latter, which of the two. I say the decision must be prompt, because Godlee's case shows that the return of excreting power in the healthy kidney may come too late to save life, if we await the efforts of nature. If it is clear which ureter is blocked, and if the kidney on that side is enlarged, temporary relief may be obtained by puncture through the loin, the sympathetic arrest of function in the healthy kidney being relieved, when the tension is taken off in the affected one. If, however, there be any doubt as to which kidney is blocked, I do not think puncture is justifiable, for our knowledge of the transference of pain shows that we may very likely puncture the wrong kidney, and if in such a condition the healthy kidney, with its function already arrested by sympathy, be punctured, it is extremely probable that the chances of its function being restored may be still further damaged, and of course there will be the same danger, accentuated by the more serious nature of the operation, in lumbar incision. The only proper course in such a case is immediate abdominal section, by Langenbüch's incision on the side on which the blocked ureter seems most likely to be found. Through this incision both ureters and kidneys can be thoroughly explored, and the further surgical procedure found necessary can be aided. If in any case it be clear that both ureters are blocked, both kidneys may be

punctured through the loins to afford temporary relief, and to gain time for the careful consideration of the further surgical procedure to be adopted.

Puncture is clearly of very limited value in calculous suppression, and is only useful as a palliative measure in some cases, and in others to give time for careful consideration as to the best procedure to adopt for a radical cure.

Free incision through the loin may be more useful for definite information, and permanent relief by removal of the calculus; but this, again, is entirely dependent upon the possibility of making previously an accurate diagnosis as to the side on which the block has taken place. Incision has two great advantages over puncture. The urine continues to flow away, and there is permanent relief of the tension, and the situation of the obstructing calculus can often be defined and its removal effected. This latter advantage may, however, be lost if the stone is very low down in the ureter, as it cannot then be reached through a lumbar incision.

In cases in which the abdomen has been opened, and the exact state of affairs made out, there should be no attempt to extract the stone through the peritoneum, but through a counter opening in the loin; or if it be very close to the bladder it may be better to perform suprapubic cystotomy, still using the hand in the peritoneum as a guide and guard, during the extraction of the stone through the bladder. My experience in the fatal case already referred to would lead me to think that this is a much safer and better proceeding than the one I adopted. Whatever the exact condition found, and the ultimate procedure adopted for its relief, it must never be forgotten that the abdominal opening is merely diagnostic and explorative, and there must on no account be any attempt to open the ureter inside the peritoneum. There is nothing in surgery which I should more strongly condemn, and I have seen with amazement in Newman's tables, that some operators have performed nephro-lithotomy in suppurating kidney through the peritoneum. It is surely needless to point out that there can be no comparison between the dangers of such a rash proceeding,

and those attending the combined operation, I am about to describe and advocate.

We must now consider what incision is best, for the certain detection and removal of a renal calculus. Recognising the difficulty in the diagnosis of a stone, and the still further complication introduced by the transference of pain in some cases to the opposite side, and the importance of being able to examine the other kidney and both ureters thoroughly, throughout their whole course, I proposed to open the abdomen by Langenbüch's incision over the suspected kidney, examine carefully both kidneys and ureters, and having found a stone, to employ one hand in the peritoneum to fix the kidney and stone, and guard the colon, while with the other I could cut down upon the stone directly from the loin, merely making an opening through the loin tissues, large enough to introduce the finger, and the necessary forceps for the extraction of the stone. The opening of the peritoneum is primarily exploratory and diagnostic, and secondarily of great advantage in enabling the stone to be accurately and quickly reached and extracted. The loin incision does not interfere with the peritoneum, and no wound is made from the peritoneal surface of the kidney; it is much smaller and cleaner than the wound necessary in ordinary lumbar nephrotomy, requires no sutures, does not leave a weak place in the loin with the chance of hernia, a not uncommon result of the ordinary lumbar operation, and admits the necessary drainage-tube through a small channel, without risk of extravasation of urine into the tissues around the kidney, or of the troubles of secondary suppuration. Having carefully considered the details of this procedure, I performed my first nephro-lithotomy by it in December, 1883, with complete success. It so happened that my next case was a stout muscular male, and I hesitated, and finally decided to perform the ordinary lumbar operation; the loin was fat and deep, the stone, which I show you here, was large and firmly fixed in the pelvis and mouth of the ureter, and I had great difficulty in loosening it and extracting it; it broke at the point, and I have little doubt that some fragment remained behind in spite of free flushing of the kidney with a warm antiseptic solution; the

convalescence was extremely tedious, suppuration was profuse, the wound healed, and then suppuration recurred, and after much suffering the patient still has a fistula, with constant discharge of pus and occasional discharge of a little urine. I much wish, for his sake, that I had had the courage of my opinions, and the further experience which has confirmed my faith in the superiority of the combined method.

My next case was also a male, and he was so emaciated and worn by the severity of his sufferings, and his inability to take nourishment, that I hesitated before I consented to operate, and at last decided to give the lumbar method another trial. I must confess that I was influenced by the wish to avoid any possible extra risk from the opening of the peritoneum, and also by the fact, that he seemed a typical subject for an easy lumbar operation. This rough mulberry calculus was very firmly grasped by the pelvis, and I was a long time getting it out, and he was so collapsed, that I feared he would not live through the night. He rallied, however, made a good recovery, and remains in excellent health. My next case was the one fatal from immediate suppression of urine. The operation was difficult, even by the combined method, owing to the fat abdomen and loin, and I much doubt if I should ever have got this small stone out by a simple lumbar incision. The patient was a bad subject, fifty-nine years old, and in broken health, from long-continued and severe suffering.

At my tenth case, for special reasons which I need not detail, I consented to perform the lumbar operation. The stone was very small, and it was by mere chance, that when just about to give up the operation as hopeless, I detected it bedded in the secreting structure at the lower end of the kidney, in the situation marked A in fig. 11. The organ was much damaged by my prolonged search, and the hæmorrhage was so severe that the patient very nearly died more than once during the first few hours after the operation, and I was obliged to remain with her all night. Convalescence was very slow, nausea and vomiting being frequently induced by movement, for months after the operation, and I much feared that some fragment of this very brittle little calculus had

remained behind; but I am happy to say that she has gradually regained her health.

I have now performed the combined operation ten times—twice in the male, and eight times in the female. All but the one fatal case already recorded have made rapid and satisfactory recoveries, with one exception, and this patient had a persistent fistula, for which her kidney was successfully removed by Dr. Savage, of Birmingham. I had feared to remove it, because I knew from my examination of the other kidney that it was also packed with stones. Dr. Savage knew nothing of this, and successfully removed the kidney. The patient, when I last saw her was in good health, but her condition is not an enviable one, for, with many stones in the pelvis of the single remaining kidney, she may at any moment be placed in great danger by the impaction of one of them in her only ureter.

Let me recapitulate the advantages which I claim for the combined operation, as compared with the simple lumbar incision. We are certain that the patient has the usual allowance of kidneys. The chances of overlooking the stone, if there is one present in either kidney, are reduced to a minimum. I do not say that the abdominal handling is absolutely infallible, but in fourteen operations I have only once failed to find a stone, and the recovery and present health of this one patient, as already given in her own words, make it highly improbable that there was, or is, a stone in her kidney. This result compares very favourably with the large number of unsuccessful lumbar explorations already recorded. Greig Smith mentions twenty-five cases of unsuccessful lumbar exploration—*i.e.*, no stone could be found. There is no fear of cutting into the healthy kidney while the stone is in the opposite one—a serious accident which my cases demonstrate as possible at any time by the lumbar method. There is no fear of accidental wound of either colon or peritoneum, because (see note on case of lumbar nephrectomy in Lecture III.) they are guarded by the hand in the peritoneum, while the kidney and stone are fixed, so that a small, clean cut upon the stone is all the damage inflicted upon the loin tissues. There is consequently infinitely less risk of extravasa-

tion of urine, or of after suppuration, and no risk of a loin hernia. There is the great advantage of ascertaining what is the condition of the other kidney, and that of both ureters.

What are the objections to be set against these advantages? Simply the making of two cuts instead of one. The increased risk, due to the opening of the peritoneum, is practically *nil*—*i.e.*, if the surgeon will take the pains to perform a thoroughly aseptic operation. I quite admit that this is the key of the position. If there is to be risk of septic infection of the peritoneum, then the combined operation is not justifiable; but I maintain that with proper care the mere opening of the peritoneal cavity and the manipulations in it necessary to examine the state of the kidneys and ureters, and to aid the execution of the lumbar extraction, are practically free from risk—certainly as free from risk, as a large wound made through the various loin tissues, by a surgeon who is not cleanly enough in his work, to avoid danger of infecting the peritoneum.

I will give in their own words the opinions of several well-known operators on the question of the propriety of abdominal incision in some cases of calculus. Morris, who certainly is no believer in my method, for he does not even allude to it in his book, says, at page 465, "But should we under these circumstances be ever justified in examining both kidneys from within the abdomen? I think we should if the patient be clearly going into a bad way, more especially if there have been at any time marked crystalline forms in the urine, and if a digital examination of the vesical ends of the ureters gives a negative result."

In speaking of lumbar nephro-lithotomy, at page 472, he says, "It is no detraction from the value or safety of the operation to have to record twenty-four exploratory operations where no stone was found." To this I reply, Perhaps not, but is it not an excellent argument in favour of some more certain method?

In 1887 Bruce Clarke mentioned, at the Clinical Society, a case in which, with the lumbar incision, "an hour elapsed before even the kidney could be found," and he adds, "It would have been wiser to perform an abdominal operation." The patient died. In

his speech at Leeds, he gives details of a most interesting case, in which a failure by simple lumbar nephrotomy was changed into a complete success, by the aid of a hand in the peritoneum.*

Yet, in the same debate, Morris spoke of the absence of any difficulty in finding the kidney by lumbar incision, and of the freedom from fatality and misfortune in this procedure. I know of at least one other case which has happened since, at one of the large London hospitals, in which the surgeon failed entirely to find the kidney by lumbar incision. Morris also said, "What was wanted was greater precision in diagnosis." Precisely, and this is what my combined method gives.

Howard Marsh, in speaking on another occasion at the Royal Medico-Chirurgical Society, said, "One point in renal surgery seemed to be coming to the front—that many stones could not be reached from the loin. Our progress seemed to be in the direction of admitting the wisdom of abdominal exploration."

Lumbar Nephro-lithotomy.

I do not propose to enter into any detail, as to the method of making the incision in this operation, because it will be fully described under the head of Nephrotomy in my next lecture. In several cases the operation has been abandoned, because the kidney could not be found at all, and, as already stated, in a large number of other cases no stone could be found. The difficulties to be encountered are, however, often only begun when the incision has been made and a stone or stones found. If the stone is small and loose in the pelvis, it may be easily extracted by a lithotomy scoop or a pair of small lithotomy forceps; but if it fills the pelvis, or is grasped firmly in the mouth of the ureter, or lies high up in one of the calyces, or is bedded in the renal tissue, much careful and dextrous manipulation will be necessary, first to loosen, and then to grasp and extract the stone. In a thin patient the kidney may be fixed by counter pressure over the abdomen, but it is very liable to slip up under the ribs, and in a fat or muscular subject no aid is obtainable by such counter pressure, the

* *Brit. Med. Journ.*, Nov. 16, 1889, p. 1087.

kidney constantly slipping about, and carrying the stone away from the extractor.

When the operator is convinced that no stone remains, the interior of the kidney should be well flushed out with some warm antiseptic solution. I use 1 in 2,000 corrosive sublimate lotion. One or more rubber drainage-tubes are then introduced, up to the kidney, but not into its interior, and a few interrupted points of suture, and a large absorbent antiseptic dressing, complete the operation. I used to introduce the drainage-tube into the kidney for the first few days, but it often gives much pain, and I find that the cases heal more quickly, and the urine clears sooner, if the wounded kidney is left to take care of itself. The length of time during which urine is discharged from the wound, varies greatly in different cases, without any very apparent reason, and I do not think there is much difference in this respect between the small incision in my operation and the larger one of the lumbar method; in the latter there is, however, often troublesome suppuration long after the urine has ceased to flow.

If no stone is found in the pelvis, each of the calyces must be carefully explored, and then the secreting tissue must be pressed between the fingers, one inside the kidney and one outside, and in parts where this cannot be done through a lumbar wound, the tissue must be pressed against the ribs or spine. Jordan Lloyd suggests the use of a small sound for exploring the calyces. I have been in the habit of using a No. 3 Duncan's uterine dilator, which answers well, and has a more convenient curve than the usual small bladder sound. Lister's sinus forceps and the ordinary nasal polypus forceps are useful, both for dilatation and extraction.

In considering whether lumbar nephrotomy is practicable, the surgeon should always take into account, the conformation of the individual to be operated upon, because while in one patient there will be several inches between the last rib and the crest of the ilium, in another they will be found to be almost touching, and even when the body is bent over so as to separate them as far as possible, not more than an inch and a half of clear space is obtainable. It is in such cases that the possible low insertion of

the pleura into the twelfth rib and the danger of wounding it require to be especially kept in mind.

The tissues divided in performing the lumbar section are, skin, fascia, latissimus dorsi, possibly serratus posticus inferior, the edge of the erector spinæ, the external and internal oblique muscles, and the transversalis; lastly the transversalis fascia, and then the areolar adipose capsule of the kidney is exposed.

There are no vessels or nerves of any consequence, but a few branches of the lumbar arteries may require torsion or ligature. Fig. 3, which I have taken by permission from Mr. Bruce Clarke's work on the same subject as these lectures, shows very clearly the relations of the pelvis, ureter, and renal vessels to each other. I have reversed his figure, so as to look at the parts from behind, as they present themselves to the surgeon on lumbar section.

The debate at Leeds, besides giving evidences of the varying views of well-known operators, clearly shows that the balance of opinion is shifting from the lumbar to the abdominal methods. Morris admits that in two of his lumbar nephro-lithotomies he was simply guided by the hard stone, and never really made out the kidney at all; and that in another case of attempted nephrectomy, after incision and drainage of a traumatic urinary cyst, he could not define the kidney, and had to abandon the operation.

Newman, from a study of the statistics of nephro-lithotomy, says that "early diagnosis and successful treatment go hand in hand."

I say, Adopt the combined method, and you will soon perfect early diagnosis, and cure your patients before their kidneys have become disorganised.

Tait, as usual, is a law unto himself. He says, "Whether the peritoneum be opened or not makes not a scrap of difference to the mortality, and makes very little difference to the *technique* of the operation."

I wish, however, that he had condescended to tell us by what incisions he performed his nephro-lithotomies, for it so happens his totals agree with mine. We have each operated fourteen times, with one death, so that a comparison of method would have been interesting.

Bruce Clarke admits a large share of conversion to the abdominal methods in nephrectomy.

Tait is the only one who gives his statistics completely—the other surgeons taking part in the discussion do not even give us enough material to guess at their results—and his statistics are not nearly so valuable as they might be, for he lumps all sorts of dissimilar cases together, under Nephrotomy, and says nothing as to the method by which each was done. Then his way of calculating percentage mortality is peculiar. He gives four exploratory operations, with no deaths, and includes them in reckoning his totals, and in a foot-note says that one of the cases died eight days after operation ; and finally, though he gives forty-three recoveries out of forty-four nephrotomies for all sorts of diseases, he says nothing as to the condition after operation, and immediate recovery. The patients had their kidneys opened, and got over it; but were they cured of their renal diseases? The cases included in the table make me very sceptical as to this important point. I think the absence of statistics, and their imperfection when given, is much to be regretted. In a comparatively new field of this kind, what we want to know is not how many operations, or what operations, can be or have been performed, but how many patients recover, and with what ease or difficulty. Anybody with moderate anatomical knowledge can remove a kidney, or a stone from it, but can he save his patient alive?

LECTURE II.

MR. PRESIDENT and Gentlemen, — I commence my lecture to-night with simple cysts of the kidney.

These usually grow from some part of the cortex, and arise from some obstruction causing dilatation of the tubules or Malpighian capsules, they contain a pale non-urinous, but albuminous fluid, often loaded with cholesterine, and occasionally with blood; they are only harmful from the pressure and distorting influence they exert on the secreting structure, and from interference with the ureter. They occasionally open into one of the calyces.*

At page 129 of the 13th volume of the Pathological Transactions, Sir Henry, then Mr., Thompson records a very interesting case in which the ureter, which passed through a portion of the cyst, was closed when the cyst was greatly distended by the pressure of the surrounding fluid. The sac communicated with one of the calyces, or with the pelvis of the kidney, for in its early history it occasionally emptied itself through the bladder, and later when Sir Henry tapped it, after a certain portion of the fluid was removed, and the pressure on the ureter thus relieved, the rest of the fluid passed off by the bladder. The patient died from rupture of the sac into the peritoneum.† Similar serous cysts may arise in the areolar tissue near the kidney, as in other sub-peritoneal areolar tissue, and are probably inflammatory in their origin. The differential diagnosis of simple cyst, from hydronephrosis, may be very difficult, but the persistence and gradual increase in size, without alternate increase and decrease, will generally be observed in the simple cyst, or if it does com-

* See case recorded by myself in Trans. of Int. Med. Congress, Copenhagen, 1884, Surgical Section Reports, Case 2, p. 147.

† Simple cysts also form in the kidney in connection with interstitial nephritis (chronic Bright's disease); these rarely attain any large size, and as they usually affect both kidneys, are not amenable to surgical treatment, even if they are large enough to cause trouble and be diagnosed.

municate with one of the calyces, and occasionally empty itself through the ureter, the sudden admixture of a quantity of albuminous fluid with the urine, should excite suspicion as to the true nature of the cyst. The differentiation of simple cyst of the kidney from the simple peri-nephric cysts named above, is pro-

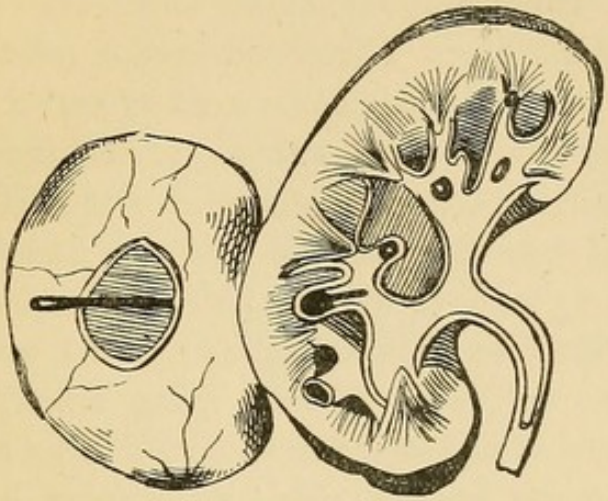


Fig. 12.

Kidney shown in section with simple Serous Cyst opening into one of its Calyces. Hole cut in Cyst Wall and Probe passed through into Calyx.

bably impossible without exploration, and it may, even with exploration, be very difficult to make out the exact relation of the cyst to the kidney in the living subject. Fortunately this is not of surgical consequence, as the treatment of all these simple cysts is dentical. (See Nephrotomy.)

Conglomerate Simple Cysts.

This form of simple cyst may cause great enlargement of the kidney; the cysts are separate from one another, very numerous and lined with epithelium; they do not communicate with the secreting structure of the kidney, and only affect the pelvis and calcyces by pressing and dragging them out of shape. Both kidneys are usually affected, and the disease is commonly congenital, but unilateral disease is occasionally met with, so that the surgeon cannot altogether ignore the disease. Similar conditions

affect the liver, the spleen, and the thyroid. I once helped Sir Spencer Wells to explore an abdomen which contained an enormous liver affected with this disease. Sir Spencer Wells believed the tumour to be ovarian. If so experienced a surgeon could be so misled by this disease, when affecting the liver, it would probably be far more likely to mislead, if occurring in one kidney only. Thiersch operated upon such a case, believing it to be hydatid of the liver. I show you here a good specimen of conglomerate renal cyst, which I removed by nephrectomy, from a lady aged forty-three. I shall refer to the case again when I deal with the operation of complete extirpation of the kidney (nephrectomy). I will only mention now that she had been seen at various times by some of the best known physicians in London, and that very different views had been expressed, tumour attached to the colon, and hydronephrosis, being among those most decidedly given. I myself at first thought it was a renal sarcoma, and then that it was hydatid ; this latter opinion I formed when seeing the patient in consultation with Sir Andrew Clark, and for the first time detecting a peculiar vibrating fluctuation. It was decided that I should puncture it, and this I did, obtaining small quantities of fluid from several cysts. I had never seen a case of the disease before, except in museums, and I certainly never suspected its true nature, till I had opened the abdomen, and gone too far with the operation to leave the kidney. The kidney and its fluid contents weighed 8½ lbs. I think, having once seen a case, I might recognise another, but the diagnosis must always be very difficult, especially to differentiate this disease from some renal and circum-renal neoplasms (fig. 13).

I should attach importance to the very peculiar vibration com municated to the hand on percussion, due, I imagine, to the partial and frequent check to the fluctuation wave, by the numerous thin septa separating the small cysts. If the other kidney can be made out to be similarly diseased, the diagnosis is pretty clear, but in my case, before the abdomen was opened, I could only say that the left kidney was large, and I thought that this was probably due to compensatory hypertrophy from extra work.

Hydatids of the kidney are not uncommon, but they are not nearly so common as those of the liver; they rarely attain a great size, because the daughter cysts usually escape down the ureter, causing in their passage colic, which may easily be mistaken for that of calculus. They also cause hæmorrhage, and blocking of ureter and urethra. Their diagnosis can only be difficult in the comparatively rare cases in which none are passed in the urine. I shall refer to their treatment when I describe nephrotomy and its uses.

It would seem natural now to pass on to the solid tumours of the kidney, but I think it will be more convenient if I first describe scrofulous and tubercular kidney, and then I shall have finished the diseases in which puncture, or mere incision and drainage, can be more or less useful, and can deal with these operations before describing the tumours, which naturally lead up to the question of nephrectomy, and the various methods of performing it.

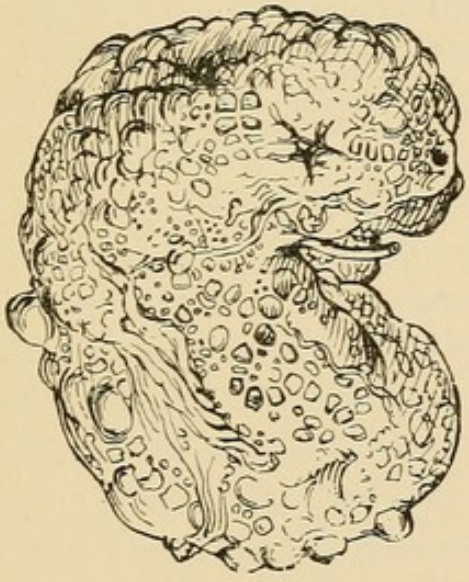


Fig. 13.
Conglomerate Cysts. Right Kidney. Removed by Abdominal Section. Opposite Kidney in early stage of same disease.

Scrofulous and Tubercular Kidney.

Under this double heading we have to consider two conditions, which, though both tubercular in origin, are in their clinical his-

tory and results, as seen by the surgeon and pathologist, very different. The tubercle bacilli are found in the urine, and in the pus in both conditions, but are not, at least so far as my experience goes, by any means always to be found in either. I am not going now to discuss acute miliary tuberculosis, which usually attacks both kidneys equally, and is secondary to tubercle elsewhere, but that form of the disease which is occasionally unilateral, and is well seen in this preparation, No. 3,577, from the Royal College of Surgeons Museum.* Judging from the preparations in the museums, it is a rare condition, and it is not noticed in most of the pathological text-books. Newman, in his excellent lectures, merely admits its possible occurrence, in the following passage: "The conditions found after death do not always show clearly the course of events, and certainly do not prove that local renal tuberculosis does not exist, even though at the necropsy a disseminated tuberculosis may be discovered." I have seen the condition I am about to describe in three cases in the living subject, and in one I had a much later opportunity of examining the kidneys, after the death of the patient. A consideration of these cases, has led me to conclude, that there is a primary renal tuberculosis, which may attack only one organ, and which does not necessarily pass on into the chronic, or scrofulous variety, with which we are all so familiar. The presence of tubercle in a single organ presupposes a lowered vitality, affecting especially this organ, or a part of it, and Newman has noted that in acute miliary tuberculosis the area supplied by a single branch of the renal artery may alone be affected. Is it not possible, then, that there are cases in which the lining membrane of the pelvis of kidney, a part specially exposed to irritations likely to produce pathological change, may be primarily, and for a time solely, attacked? Such cases would never be seen when kidneys were only examined after the death of the individual, but might occasionally be found in the post-mortem room, in subjects dying a sudden death from

* The disease is more advanced here than in such cases as I am considering, and I merely show the specimen because the small tubercles on the lining membrane of the pelvis are well seen, just as I have felt them in the living subject.

accident, or from some distinct acute disease. Given the possibility of such a condition, and bearing in mind the result of incision and drainage in some cases of peritoneal tubercle, is it not more than likely that surgery may be able to arrest the disease, while it is still so very local? Speaking of these tubercles, Newman says, "Being due to the presence of a virus, they have a strong analogy to other inflammatory formations." Now we know that such inflammatory formations in other parts of the body sometimes require the aid of surgery to destroy the virus, and set up healthy action, may not local tubercle be susceptible to the same treatment? I believe that the following cases illustrate my point, and that with the progress of renal surgery this very interesting subject will be further demonstrated :—

The first case is that already referred to, as operated upon by lumbar incision in 1878. All the symptoms were those of calculus —pain over the kidney and down the ureter, with attacks of colic, then hæmorrhages, and finally profuse suppuration, and enlargement of the kidney. When I opened into the pelvis, I found its lining membrane covered with little seed-like tubercles, and there was no stone ; the patient was immediately relieved of all her symptoms, but the fistula persisted, and the other kidney becoming affected, she died of uræmia seven months after the operation. The post-mortem revealed extensive tuberculosis of the kidney operated upon, and of the rest of the urinary organs, the other kidney having evidently been more recently attacked, and probably by extension up the ureter. In neither kidney was there ulceration or caseous deposit. The patient was at the time I operated upon her a stout, rosy woman, so much so, that I should have doubted her statements as to the pains she suffered, had I not seen her actually in great agony.

The next case was that of a single woman of twenty-three, fair and stout, but pale and pasty-looking. The illness had commenced three years before I saw her, with sudden attacks of vomiting, usually in the night ; these were quickly followed by pain over the right kidney, shooting down the ureter, and to the inside of the thigh ; micturition was not painful, but when the pain was bad there were constant calls to empty the bladder ; pus ap-

peared in the urine comparatively early in the illness, and was passing, but not in large quantity, when she came under my care. The urine also contained a good deal of renal epithelium, some of the cells having large vacuoles in them. It was not examined for tubercle bacilli. She had never passed gravel, stone, or blood in any form, so far as I could make out. The case was sent to me as one of calculus, but I did not think that it was calculus. There was a distinct tumour in the situation of the right kidney, just as in the previous case, and in neither did it vary in size. I explored the kidney by lumbar incision in February, 1884. The kidney substance was softened and very vascular; the lining membrane, though smooth and healthy, had under its surface several little growths (? tubercles), feeling like small shot. I drained the kidney and she got rapidly well, and in little more than a month wrote to say that the wound had quite healed, and that she was gaining strength. Some years afterwards she had some return of pain in the side, and I sent an order for her readmission to the hospital, but she wrote that the pain had passed away, and that she was quite well again. She continues well.

The third case was one of those already referred to, as having been treated for hydro-nephrosis, by incision and drainage. The symptoms in this case were so like those of calculus, that I quite expected to find one, but found instead the little shot-like growths projecting from the lining membrane of the pelvis, and especially just in the mouth of the ureter, and I have no doubt that they extended into it, and caused obstruction to the passage of the urine. The drainage-tube has still to be worn, and attempts to do without it, cause recurrence of all the old symptoms. The patient has a tubercular history and appearance, and though she has gained in health since the operation, pus has begun to flow with the urine from this kidney in some quantity, and I much fear that the disease is progressing.

The first of these cases shows that we may have a primary acute tuberculosis limited at the beginning to one kidney, and going on to a fatal termination by extension to the other kidney, and suppression of urine, without ulceration and caseous deposit, never becoming, in fact, the well-known scrofulous kidney.

The second case suggests, that if such a case is opened and freely drained, the disease may be arrested in its local form, and never become generalised.

The third case is not yet concluded, but I fear it teaches us not to expect a cure in all cases from mere incision and drainage; just as experience has shown, that some, but not all cases of tubercular peritonitis, may be arrested by incision and drainage.

My contention, then, is, that there is a localised primary acute tuberculosis, occasionally met with in the kidney, and that it may be arrested by early incision and drainage, or may be only relieved as to its symptoms by this procedure, and may then infect the other kidney, and cause death in a few months by uræmia, without passing into the chronic or so-called scrofulous form.

I do not deny that the majority of cases pass quickly into this chronic form, but, I think many might be arrested by a sufficiently early diagnosis, followed by free incision and drainage.

Pathology.—I cannot better describe the scrofulous kidney than in the words of Newman: "The principal seat of the lesion is the apices of the papillæ, in the calyces, or in the pelvis of the kidney, and from hence, partly by the blood stream and partly by the lymphatic channels, the material virus is carried within the substance of the kidney. The primary focus becomes occupied first by miliary tubercles, and subsequently by a caseous mass. In the course of a few weeks or months this mass forms an irregular softened area, which by progressive peripheral infiltration spreads inwards. At the same time, by infection, new, and to the naked eye apparently independent nodules develop in the tissue around, while in more remote parts of the kidney, and in the mucous membrane of the pelvis, an eruption of opaque white nodules may appear. In recent cases, these diminish in size and number, the more distant they are from the primary focus, but when the disease is of long standing the individual nodules cannot be distinguished. The constructive process which has just been described is rapidly followed by a destructive one. The tubercular nodules, having attained a certain size, undergo caseous necrosis, break down, and when in the pelvis of the kidney they become replaced by

a tubercular ulcerating surface, or if within the renal parenchyma they are transformed into irregular globular cavities. These, as they enlarge, become elongated, and assume a pyriform shape and approaching the cavity of the renal pelvis, rupture into it. As the destructive process extends from within outwards, greater and greater portions of the renal substance become involved, until finally the whole of the medulla and a large portion of the cortex may be destroyed. This leads to the formation of a large cavity. But besides the encroachment on the renal tissue by tubercular disease, dilatation and sacculation of the organ may be caused by a blocking of the ureter, ultimately producing a tubercular pyo-nephrosis, which sometimes, when the other kidney is free from disease, destroys all vestige of urine-secreting tissue. Should only one organ be involved, the kidney may, by a drying-up of the contents of the pyo-nephrosis, become converted into a shrivelled, putty-like mass (fig. 14). But if the ureter be permeable, the urine washes away the collections of *debris* and the products of suppuration, which present a characteristic appearance, to be referred to presently." This *debris*, in its passage down the ureter, and through the bladder, often infects their mucous surfaces, and this infection frequently travels up the mucous membrane of the opposite ureter, and so infects the other kidney.

Etiology.—The causes of primary tuberculosis of the kidney are obscure; probably heredity is the predisposing element in most cases; certainly it has been distinctly traceable in the cases which have come under my own observation, the local exciting cause being most commonly exposure to cold and damp, and in women very often during menstruation; the specific virus is probably in the system, and then some accident determines the weakening of the vitality in the part attacked.

Symptoms.—These are unfortunately not very marked in the early stages; kidney-ache, albumen, and traces of blood in the urine are usually the earliest. Later the urine becomes alkaline, contains pus, then triple phosphates, and *debris* of the renal tissues, and is putrid. Later still, swelling of the affected kidney is discovered, colic alternates with discharges of pus through the

bladder, and suppression of urine, with fatal uræmia, may supervene.

Diagnosis.—Of course if the tubercle bacilli can be detected in the urine, the diagnosis is certain. A small quantity of the deposit from the urine should be dried on a slide, then treated with aniline magenta or gentian-violet staining fluid; then, with a twenty-five per cent. solution of nitric acid to remove the stain from all the material but the bacilli, and washed in pure water, the minute rods stained with the dye then become visible, with a power of 750 diameters.

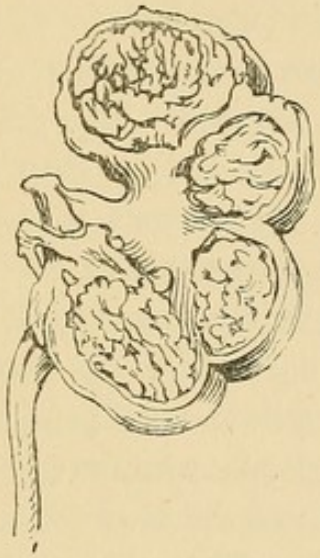


Fig. 14.
Shrivelled Tubercular Kidney, containing Calcareous Matter (B. Clarke).

Catheterisation of the ureters may be employed to decide whether one or both kidneys are affected, but I must confess that I regard this proceeding with suspicion, as being very likely to damage the healthy ureter, and by so lowering its vitality encourage the disease to invade it. The endoscope may be a safer instrument, showing whether the urine issuing from both ureters, or only one, contains pus, but I have no experience in its use. It can only be useful to decide whether one or both kidneys are affected; it does not help us as to the pus being tubercular or

calculous. The differential diagnosis of tubercle, and calculus, is in some cases very difficult; in both in the early stages there may be pain, occasional slight hæmorrhages, and slight albuminuria, but no pus, and no enlargement of the kidney. Later in both conditions there may be more serious hæmorrhages, much pus, attacks of colic, and marked enlargement of the affected kidney. The evening rise of temperature, when present, is an important indication of tubercle, but it is not always present. The hæmorrhage in tubercle, being due to the progressive ulceration, is more irregular in its occurrence, and more constant, often coming when the patient is at rest, whereas in calculus it nearly always follows some unusual strain or movement. Patients with renal tubercle, even when it has advanced to complete destruction of the kidney, are often robust-looking, with bright colour; but this, again, is an uncertain sign. The discharge of pus is more constant from a tubercular kidney, than from one containing a calculus, from which it often comes in sudden gushes, the urine between times being comparatively clear. Newman states that in tubercular disease frequent micturition is invariably accompanied by pain. But this is not correct. I have seen more than one case in which there was little or no pain, and have had recently under my care a young lady who never had pain at all, till the kidney was punctured, and the disease thus diffused into the perinephric tissues. And, as I have already pointed out, the emaciation, careworn expression, fever, night-sweats, and anorexia, upon which he lays stress, as being distinctive of tubercle, may, at any rate in the early stages of the disease, all be absent.

When the bladder becomes infected, micturition is still more frequent, and often terribly painful, but at this stage the diagnosis ceases to have the same interest for the surgeon, as the time for his aid has gone by.

I will now remind you that we have considered the following affections of the kidneys: hydronephrosis; pyonephrosis, due to the suppuration of a hydronephrosis, to injury to the kidney, to calculus, and to acute and chronic tuberculosis; pyelitis; renal abscess; perinephric abscess; calculus; renal colic; calculous suppression; simple cysts; simple conglomerate cysts; and hydatids.

For all these conditions, puncture through the loin, and lumbar incision, have to be discussed. I have already sufficiently referred to needling for calculus, which is one kind of puncture. I have also called your attention to the precautions to be taken in performing aspiration by trocar and canula, but in this connection let me add two warnings: First, never, under any circumstances, use for exploratory puncture that surgical abomination a grooved needle, for it will allow infiltration, or infection of all the tissues through which it brings the fluid. Always use a thoroughly aseptic trocar and canula, and a trustworthy aspirator, which will not admit air as the fluid is withdrawn; or use a simple trocar and canula, with full Listerian precautions, not forgetting the now too often discarded spray. And whatever instrument you use, be careful in withdrawing it, as in withdrawing a catheter from the bladder, to bring out with it all the fluid it contains, and not to leave a portion of this in the tissues through which the canula passes after leaving the kidney. I have seen the most distressing and disastrous results follow the puncture of a tubercular kidney, by a surgeon who is specially experienced in the treatment of renal disease. The second warning I would emphasise is, never to tap a suspected renal tumour through the anterior abdominal parietes, *i.e.*, through the peritoneum. From this rash proceeding I have also seen immediately fatal results.

I have just referred to the use of the carbolic spray as an alternative to the aspirator; and as I am one of the few who remain faithful to the spray, after even Lister himself has abandoned its use, I think I may be allowed to explain the present state of my belief in its efficacy.

First, I believe it is useful during an operation, in keeping a moist antiseptic atmosphere over everything, so that minute dry particles are immediately caught and moistened by a strong solution of a powerful germicide, while the hands of the operator and his instruments, as well as the tissues of the patient, are never allowed to become caked with dry blood, or wound secretion, mixed with and holding firmly small dry particles from the atmosphere of the room, or perhaps the still more dangerous moist particles from the breath of those engaged in the operation, or

present as spectators. This constant moisture of everything with an antiseptic solution, especially when aided by frequent dipping of the hands and the instruments in a warm 2½ per cent. solution of carbolic acid, renders the use of the sponges much more efficient in thorough and rapid cleansing of the wound and its surroundings, than is possible if the same parts are dry, and constantly drying with the temperature of the patient, and the warm atmosphere of the operating chamber. If it be urged that plain water will serve this purpose equally well, I deny the statement, because so-called plain water may, and frequently does, contain in a moist, and therefore quickly active condition, the very causes of wound infection. This brings me to the second advantage derived from the steam saturated with carbolic acid. It is urged that it is useless, because much stronger solutions fail as germicides, with certain potent germs, even when they are long exposed to their action. Those who argue thus, forget one important element in all surgery, *i.e.*, the vitality and resisting power of the tissues. Now, I firmly believe that this vital action may be, and is, much aided, when the germs of infection are delivered over to the tissues weakened by being soaked in a strong antiseptic; perhaps this does not kill them, but it renders them a much easier prey to the active leucocytes. If this has been or can be experimentally disproved, the record of the experiments has escaped my notice. Now let me direct your attention to the value of the spray in tapping a cavity filled with a putrefiable fluid, some small portion of which is certain to remain behind, however carefully we may try and empty it. If an open canula instead of an aspirator is used, air replaces, to some extent at any rate, the fluid withdrawn. Such air contains the dry or moist germs of simple putrefaction, or of some more deadly poison; they are introduced into a fluid prone to change, and by its bulk removed from the vital influences of the lining membrane of the containing cavity, this being, moreover, weakened by disease, as in the lining membrane of the pelvis of the kidney in calculous, or tubercular disease. The result of such careless tapping is, that in a few hours or days, violent putrid irritation, or some deadly form of blood poisoning, develops in the disease sac. But

tap under the same conditions, with a carefully asepticised trocar and canula, under the spray, and let the air go in and out freely, and no harm results. I have done this over and over again, in every conceivable variety of cavity, and yet no putrefaction has followed. I have seen others perform exactly similar tapping, with a carefully purified instrument, but with no spray, and the procedure has been shortly followed by putrid suppuration, and all its dire results. This is demonstration by practical surgery. Let those who scoff at the spray explain the difference in results as they may, I have given you facts from a wide experience, and I have told you how I believe it acts, and till I get some better explanation I am content with my own, and I will continue to protect my patients with the spray. All I have said here applies with even greater force when we come to deal with the opening of the peritoneal cavity, because there the germs are, in this half-poisoned condition, introduced into the presence of a membrane of extraordinary vital power. The success recently attending so-called "cleanly surgery" is the best evidence of this extraordinary power of the peritoneum. Wash it well with simple water, which does not irritate it, and which does not allow lumps of material containing the germs to lurk in its recesses, and drain off the serum and blood for the first few hours, and it will, except in occasional cases, when the patient's vitality is too much lowered, or the virus introduced of too malignant a kind, make short work of the germs, which must be introduced in enormous quantities, both from the air and in the water. The frequent septicæmia in the early days of abdominal surgery, was due to three agencies—carelessness in the introduction of infective material from without, on hands, instruments, and sponges; irritation of the peritoneum by too much sponging; and leaving little lumps of clot, and putrefiable material, shut up without drainage, in a hot cavity, bathed with serum, poured out from an irritated membrane, and serving to protect the germs in these little lumps from the active vitality of the peritoneum, by keeping them out of actual contact with its surfaces. All these mistakes are avoided in "cleanly surgery," but its results are not equal to pure "aseptic surgery," because it neglects the possibility of occasional de-

pressed vitality in the patient, becoming associated with specially active poison; while real "aseptic surgery" provides against this, by taking care that in every case the germs shall have their vitality also lowered, as much as possible, before they gain access to the peritoneum.

My critics will immediately say, Do you, then, admit no disadvantages from the cold spray, and the powerful poisonous and irritating chemical agent? To them I reply that I fully admit the dangers, but that I can guard against them, and that experience teaches me, that when so guarded against, they are practically inert, and bear no comparison to the dangers of mere "cleanly surgery." The disadvantages are, working in a mild species of fog, a certain chilling of the patient's tissues, and the irritation produced by the local action of the caustic and poisonous carbolic acid. The first of these entirely disappears with a little use, and is far more than counterbalanced by the comfort of constant moisture; the second is readily avoided by keeping everything well covered with sponges and towels, wrung out of a warm carbolic solution; and the irritation of the antiseptic is easily reduced to a minimum if the lotions are carefully prepared, and the sponges are thoroughly squeezed, not too much used in rubbing peritoneal surfaces, and not left in the cavity either several at a time, or singly for long periods. I have not for years had reason to think that any of these disadvantages have damaged the chances of a patient, and certainly for the last ten years I have not lost a patient from carboluria, or carbolic uræmia, though I have occasionally seen, in my own practice, septic uræmia as the final fatal symptom, in a case in which, from the previous presence of putrid pus, I was unable, with all my care, to perform a thoroughly aseptic operation.

I have now fully explained the extent and limitations of my faith in antiseptics, and I shall not again refer to the subject, but I shall ask you to remember that when I am advocating any surgical procedure for the relief or cure of renal disease, I am advocating it only on the distinct understanding, that it is to be performed with every protection that antiseptics can give. Many things I would do on this understanding, which

I should consider utterly unjustifiable, and almost criminal, without such precautions. Of course criminality in such matters must depend upon our views and faith; those surgeons who are unable to see these matters as I see them, and who conscientiously hold other views, may perform their operations without the safeguards which I consider essential, and though I may think them blind and mistaken, I would not for a moment let it be thought that I accuse them of any worse fault; but holding the views I do, for me to perform operations dangerous to life, on any other system would be distinctly criminal.

Puncture.

Puncture of the kidney may be useful to clear up a doubtful diagnosis, as to an enlargement of the organ being solid, or in part fluid; may be curative in simple serous cyst, or in hydronephrosis; at any rate it may be tried in some cases, before performing any more serious operation, though the chances of thus obtaining a permanent cure are small. In renal and circum-renal abscess it may be a useful preliminary to free incision and drainage, but the latter procedure should follow immediately, when the exact situation of the pus is made certain by the puncture. I do not think it is ever justifiable to puncture in hydatid disease, for it is impossible thus to thoroughly evacuate the daughter cysts and membranes, and experience shows that suppuration is frequently induced by puncture. Puncture is urgently indicated in calculous suppression of urine, but I have already sufficiently discussed this serious condition.

I do not believe that puncture is ever justifiable in pyonephrosis, for it is almost certain to allow escape of pus into the adipose areolar capsule, and into the other tissues around the kidney, and the perinephric suppuration thus started, whether simple or tubercular, adds greatly to the risk of any future curative operation, as I shall point out at greater length when I discuss nephrectomy.

I shall not attempt to give anatomical guides for the selection of the exact point of puncture; careful percussion in each case is the only safe guide.

Aspiration may also be justifiable as a means of temporary relief, when distension is causing great pain, and it is impossible to perform immediately a curative operation. It is also useful in the course of the operation for complete removal of the kidney, to avoid rupture and fouling of the wound, during the subsequent enucleation; but the puncture is very difficult to close effectually, and in most cases it is far easier to enucleate the kidney when tense and full, than when relaxed by withdrawal of its fluid contents. I shall have more to say on this subject when describing the details of abdominal nephrectomy.

In introducing a needle or a trocar, care must be taken not to transfix the organ, and to keep the point well away from the hilum and renal vessels.

After the withdrawal of the trocar, the site of puncture should be covered with a small dry antiseptic dressing, retained in its place by a round piece of adhesive plaster with snipped edges, and if there is a large hollow left, a pad of cotton wool, and a flannel binder, will add greatly to the comfort of the patient.

Nephrotomy.

Puncture is really a form of nephrotomy, but the operation I am about to describe, is that of exposure of the kidney by lumbar incision, followed by incision into the substance of the organ, or through the wall of its pelvis, either for the evacuation of fluid or for the digital exploration of its interior.

In speaking of the complete extirpation of the kidney, I shall have to discuss both the lumbar and abdominal incisions, and shall give the reasons which make me prefer the latter; but when the kidney is to be merely incised for the purposes named above, and for subsequent drainage, there can be no two opinions as to the lumbar incision being the only one at all justifiable. I have already said that puncture through the peritoneum must not be thought of, still less must incision, when a track is to be left open for drainage.

In lumbar nephrotomy some surgeons place the patient over a pillow in the semi-prone position, so as to widen the interval between the last rib and the crest of the ilium, as much as

possible, and in patients in whom this space is very narrow this position may be necessary, but it has obvious disadvantages in the future steps of the operation, and for simple exploratory incision, I have always found that I could work quite well with the patient laid flat on the back, with the side to be operated upon projecting well over the edge of the table.

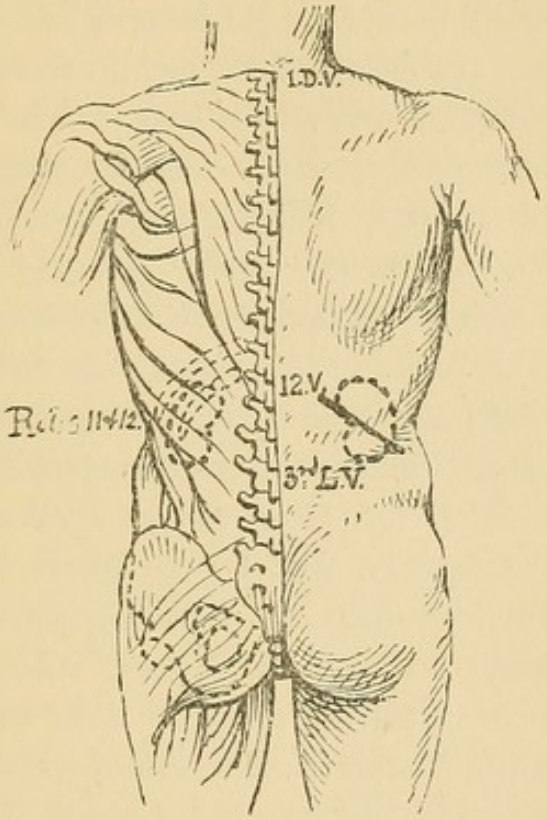


Fig. 15.

Diagram to show the Position of the Kidneys from behind, and their Relations to the Ribs and Vertebræ. The line across the Right Kidney marks the incision in Lumbar Nephrectomy.

The external incision should be oblique, from near the lower border of the last rib, and the outer border of the erector spinæ muscle, downwards and forwards towards the crest of the ilium, it may be from three to five inches in length, according to the space available in the individual, and according to the depth of

the loin tissues.* I generally find a three-inch incision quite long enough for the class of cases we are considering, and the risk of subsequent hernia, if the incision is long, must not be forgotten. The first incision may be freely made through the skin, the subcutaneous fat, and the outer layer of muscles; the bleeding points should then be ligatured with prepared catgut, or fine silk; pressure forceps are troublesome in the restricted space available; the deeper muscles and lumbar aponeurosis should then be carefully divided till the perinephric fat is exposed, the finger of the left hand guarding meanwhile the lower border of the rib, in case there is a low attachment of the pleura. The exposed fat should be carefully worked through with the finger, till the smooth surface of the kidney is reached. The necessary examination of its condition may now be made, and the point of incision into its substance, or pelvis, decided upon. The object to be attained will decide in which situation the incision shall be made; when possible, I much prefer to incise the pelvic wall, for though the hæmorrhage from the kidney substance, even when profuse at first, usually stops spontaneously, there are exceptions to the rule, one of which I have already mentioned in speaking of lumbar nephro-lithotomy, and I have always found incisions in the pelvis heal well, with the single exception, in which Dr. Savage afterwards removed the kidney. Cicatrisation of a free incision into the secreting structure must be more liable to damage the organ for future use, than a cut in the pelvis, but it is quite conceivable that free incision into the secreting structure, and its depletion by bleeding, may be necessary to obtain a cure, in some obscure cases, such as the one already described, in which I found no stone.

Whether the incision be for the evacuation of a simple cyst, the emptying of a hydronephrosis, or to let out pus, or to remove a stone, the interior should be carefully examined by the finger, to estimate the condition of the lining membrane, to let out pockets of pus, or to find an encysted calculus. After the exploration the kidney should be well flushed out with some warm anti-

* A reference to fig. 15 will show that this incision crosses the centre of the kidney, and fully exposes the back of the hilum.

septic solution, one or more rubber drainage-tubes introduced into the loin tissues, and up to the kidney, but not into its interior, the wound closed around the tube or tubes with interrupted sutures, which should embrace all the divided loin tissues, and the adipose areolar capsule. In some cases, for instance, if the kidney is too mobile, some of the sutures may include also its cut edges, or some deep sutures of kangaroo tendon may be introduced into the renal tissue, after the method of P. Gould.

The discharge will, in all cases, be at first considerable, and a large absorbent antiseptic dressing should therefore be applied, and changed at least once in every twelve hours. I do not think, that this is one of the cases in which the use of the spray is absolutely necessary, as the main mass of the dressing can be removed, and the last small deep dressing easily replaced by a fresh one, without any fear of entrance of air, or of exposure of the open end of the tube, and the spray is very chilling to the large surface wet with urine and discharge, and close to the pleura. For the same reason I have long abandoned the use of the spray in amputations of the breast, as it is impossible, especially in clearing the axilla, to protect the chest from great chill.

Indications for Nephrotomy.

Having described the method of performing this operation, we must consider what are the indications for its use.

It is almost as safe, and much more sure than puncture for the cure of simple cysts. It is, when aided by after drainage, the only proper treatment for hydatids, for abscess, whether in the substance of the kidney or in the surrounding tissues, and it is often urgently indicated in calculous suppression of urine. It may be tried in hydronephrosis, though my own experience does not favour its employment in this disease. It may be used for the extraction of a calculus, but I have already fully stated my opinion on this matter. It is advocated by many surgeons in the various forms of pyonephrosis, but I would restrict it, in this connection, to simple pyonephrosis resulting from injury, and to primary tubercular pyonephrosis, when it can be diagnosed sufficiently early. I have already given notes of a case, in which I

believe that it resulted in a permanent cure of the latter condition, and also of the excellent result obtained in the traumatic case at Dublin.

I will now give my reasons for objecting to the lumbar incision and drainage, in the more advanced cases of calculous and tubercular pyonephrosis, especially to this proceeding when used as a preliminary to nephrectomy. I object to it then, because without offering any compensatory advantage, it leads to prolonged and exhausting suppuration, to infection of the loin tissues with the pus from the kidney, and to adhesions and fistulæ, which make a future nephrectomy much more difficult and dangerous. I know that many surgeons, for whose opinions I have the greatest respect, have formed, and expressed, a different opinion on this matter. I cannot state their case better than by quoting from Greig Smith's "Abdominal Surgery," page 535. He says, "Nephrotomy for abscess is frequently a curative proceeding—more frequently, probably, than published records would lead us to suppose." I cordially agree with the first part of this statement, but I have my doubts about the latter. Cures of all kinds are pretty well known; it is his failures that the bashful surgeon is so prone to bury in the recesses of his own memory, or note-books. He then proceeds, "Even if cure does not follow, no harm is done, but rather good. For the patient, in view of further operative proceedings by nephrectomy, has been tided over the immediate danger of an acute illness, and has gained strength, while the kidney is diminished in size, its vessels are smaller, its tissue is less friable, and its surroundings are more tolerant of surgical interference."

From this view of the case I strongly dissent; it may be true of the rare cases in which a fistula persists, after the opening of an acute renal or circumrenal abscess, but these are not the cases under discussion. It is the chronic cases of suppuration, the result of prolonged calculous irritation, or of advanced tubercular disease that we have to consider. The prolonged and exhausting suppuration, which frequently follows a nephrotomy in these cases, cannot but weaken and injure the patient, and tend to produce amyloid disease in the opposite kidney. The diminution of the

size of the vessels, even if it occur, and such change must necessitate very prolonged drainage, is a matter of no consequence in these days of aseptic ligature and forci-pressure. The diminution in the size of the kidney is of equally little consequence, for this can, when advisable, be rapidly produced during nephrectomy, by the use of the aspirator. The advantage of the less friability of the kidney, and of the tolerance of surrounding parts, is dearly bought by the presence of a permanent fistula, and by the replacing of soft and easily divided adhesions by dense cicatricial tissue, not to mention the extensive formation of adhesions in the track of the lumbar operation, which would have had no existence but for that operation. This fistulous track is certain to be putrid, as are the contents of the kidney, after prolonged external suppuration; for if putridity is not present, the sinus is pretty certain to heal; but this cannot happen in the presence of multiple, or branched calculi, or of caseous masses in the deep recesses of the kidney. How, then, are we to protect the tissues freshly divided during the nephrectomy from this foul matter? It is quite possible to enucleate a pyonephrosis entire, and without fouling of the wound, before there is a sinus, but quite impossible after there is one. I am glad to see, from the report in the *British Medical Journal* of November 16th, of the discussion on renal surgery at the Association meeting at Leeds, that Morris, who has been one of the chief opponents of my views on this subject in the past, has now come over to my side, the only point now in dispute between us being the important one of lumbar, or abdominal, incision. As experience has converted him in one direction, I do not despair that further experience may convert him in the other. He is reported to have spoken on this subject as follows:—

"I have till the last year or two advocated incision and drainage for pyonephrosis; and repeated tappings, followed, if necessary, by nephrectomy for hydronephrosis, when large enough to form an abdominal tumour. The results of this treatment have, however, been disappointing, for the tapping has had to be again and again repeated, and nephrotomy has frequently been followed by urinary fistula in the loin. . . . In three cases in the last

twelve months I have, therefore, performed lumbar nephrectomy, without any preliminary operative treatment, and in each instance the patient has made a rapid recovery."

Later on he sums up the matter as follows :—

"For the above reasons, I have come to the conclusion that nephrectomy, without previous incision or drainage, should be more frequently resorted to than has been the practice hitherto in these cases." I am glad to note, too, that Morris has also some doubts, as to whether it will be always possible to remove a kidney by lumbar nephrectomy, when the perinephric adhesions resulting from slow effusion of urine behind the peritoneum, drainage, etc., are very dense and extensive. I can assure him that I have never found it impossible to remove one by the abdominal method, and so here again I nourish hopes of an extension of his conversion to my views.

The only cases in which we can, in my opinion, gain any advantage by preliminary incision, are those in which the suppuration has already broken through the kidney wall, and become diffused into the tissues around the kidney. If by incision and drainage, in such a case, we can, without too great and prolonged a drain, reduce the large diffuse suppuration to a mere fistulous track, then, I think, a preliminary incision may be useful; but this is not a preliminary nephrotomy, but the mere application of ordinary surgical rules to a diffuse suppuration outside the kidney. I think I might have gained something in two of my fatal nephrectomies, had I adopted this procedure. I doubt if it would have saved the life of either, but I think it very probable that it would have demonstrated the unfitness of the other kidney to bear any extra strain in the last case, and would have thus saved abdominal nephrectomy from the reproach of one fatal case. In the first case there was an enormous diffuse suppuration, behind and around the kidney, and I aspirated with temporary relief, but without any real gain in the health of the patient; then, when the pus reaccumulated, I proceeded to abdominal nephrectomy, and she died exhausted by the enormous discharge of pus from the extra-peritoneal abscess, but with no sign of peritoneal trouble. (See report of Case No. 20, in my paper on "Twenty-five Cases

of Abdominal Nephrectomy," in the Transactions of the Royal Medico-Chirurgical Society for this year, 1889.) The second case was one of those I have operated upon since the publication of that paper, and the first nephrectomy that I have lost from suppression of urine. The patient was a young lady of twenty-five, suffering from chronic tubercular kidney, of two and a half years' duration, as far as symptoms are a guide. Seven months before I saw her the kidney had been tapped through the loin, the immediate result of the operation being a few ounces of curdy pus, the ultimate result being a large diffuse tubercular suppuration behind and below the kidney, with a great increase of suffering to the patient. She was in a very exhausted condition, and very weak, but I decided, after consultation with Dr. Broadbent, to give her the last chance afforded by nephrectomy. We were guided to this decision by the fact that the urine was of good specific gravity, did not contain more albumen than the pus would account for, and deposited urates copiously, although the excretion of urea was very low. We thought the latter was greatly to be accounted for by the small amount of food taken, and the entire rest in bed. The operation was a long and difficult one, and there was an enormous diffuse abscess cavity to be cleared out, after the kidney had been removed. I drained both by glass tubes in the abdomen, and by rubber tubes in a counter opening through the loin into the abscess cavity, but very little discharge came from either. Four hours after the operation 3 oz. of good urine were drawn off, in another four hours 4 oz. more ; she then passed naturally 2 oz., and the same quantity at intervals, till 24 oz. had been passed in the twenty-four hours All the specimens were good, and the later ones were loaded with pink lithates, and free from albumen. At the end of the twenty-four hours she only passed ½ oz., and continued to pass small quantities frequently, till 11 oz. had been passed in twelve hours. During the whole thirty-six hours she was restless, slept but little and vomited frequently ; the temperature only rose to 99·8°, and then fell gradually to 98·6°, the pulse rising gradually from 100 to 120, and steadily losing power. After the thirty-six hours she ceased to pass any urine, and only ½ oz. was obtained by the catheter, and this was concentrated and albuminous. The pulse

now steadied to 108, the temperature remaining at 98·6°. Just forty-eight hours after the operation she had convulsions, became rapidly comatose, and died fifty-three hours after the operation, the temperature having fallen in the last hour of life to 97°. I was not able to obtain any post-mortem, but it was quite clear that the other kidney, though able to secrete good urine, was not equal to the great strain thrown upon it. This extra work was evident from the large quantity of lithates which appeared in the urine, sooner than usual, after the operation. I think, if time had been gained by free drainage of the abscess, before the kidney was attacked, the result might have been different, but it is quite possible that the kidney would not have been able to do its work during the early days, after the evacuation of this large abscess.

I now give notes of a case to show how little may be gained, nay, rather how much may be lost, by nephrotomy and drainage, when the suppuration is still confined to the kidney—Case 2 in the table of twenty-five abdominal nephrectomies already referred to. The later history of this case, and the results of immediate nephrectomy in seventeen other cases of chronic suppuration (calculous or tubercular pyonephrosis), the pus being still confined to the interior of the kidney, prove absolutely the excellent results that can be obtained. Only two out of the seventeen died—one from injury to the vena cava, and one from hemiplegia, the result of the anæsthetic, the suppuration in the kidney having nothing to do with the death in either case.

M. D., aged twenty-six, married five years, mother of two children, began to suffer pain in the back and right loin, in the early days of the second pregnancy, then pus appeared in the urine. An inflammatory attack a week after confinement was followed by the appearance of a swelling in the right side of the abdomen. Six months later she was placed under my care by my friend and colleague Dr. Prickett, with a large suppurating right kidney, the urine loaded with offensive pus, and the general condition about as bad as it could be. I had at that time only once performed nephrectomy, and I feared to risk it, and performed nephrotomy. At the end of a month's drainage, she was obviously steadily sinking, and I determined, as a forlorn

hope, to perform abdominal nephrectomy. Convalescence was rapid, the temperature being normal two days after the operation, for the first time since she had been under my care. It rose to 104·6° after the nephrotomy, and was for days over 102°. Nothing was gained, and much was lost, by that preliminary incision. Adhesions were more extensive, and more dense; there was the foul sinus to be dealt with, and her general condition, as evidenced by temperature, pulse, anorexia, heavy sweats, etc., was made materially worse, while the nephrectomy at once changed everything. When last heard of, six years after the operation, she was in good health.

My own first case, supported by the excellent results I have given you, in a long series of similar cases, has settled this question for me.

Before leaving the operations of puncture, and of lumbar nephrotomy, let me briefly summarise the results of my experience.

I would restrict the use of puncture as follows:—

1. To decide, in doubtful cases, between solid and fluid tumours of the kidney.

2. To relieve painful distension, when nephrotomy, for some special reason, is not at once advisable, or possible.

3. To remove urine, or serum, or pus, from a very large tumour, to reduce its bulk during the performance of nephrectomy.

4. As a tentative attempt at cure, in some cases of simple cyst, or of hydronephrosis, though the chance of cure is, I think, very slight.

5. To localise the position of renal, or circum-renal abscess, when the physical signs are not clear enough for free incision. In such cases to be immediately followed by free incision, when the pus is found.

6. To gain time, and relieve the harmful tension in some cases of calculous suppression.

I would restrict the use of nephrotomy—

1. To cases of calculous suppression, in which incision seems preferable to mere puncture, with the chance of being also able

to remove the stone, *i.e.*, if further experience shows that this is a safer and better operation than my combined method.

2. For the cure, by subsequent drainage, of simple cysts, abscesses, and hydatids. The question of possible cure in some cases of hydronephrosis to be further tested.

3. For the cure, by subsequent drainage, of traumatic pyonephrosis or pyelitis, and in the early stages of tubercular suppuration.

4. For the possible cure of more advanced calculous or tubercular suppurations, when the patient will not submit to nephrectomy.

5. For the performance of nephro-lithotomy in some cases, if extended experience shows that this procedure possesses any advantages over the combined method, or when those who have no experience in abdominal surgery are compelled to operate.

LECTURE III.

MR. PRESIDENT and Gentlemen,—I have now arrived at a very important branch of my subject—renal tumours.

All swellings are, surgically speaking, tumours, and a large number of the conditions which we have already considered might, therefore, be classed under renal tumours; some of them, such as the simple cysts and hydatids, are actually tumours, even in the strict acceptation of the term, but the tumours which we are now going to consider are the solid neoplasms. A very great variety of cell elements, and an equally great variety in the distribution, or arrangement of these elements are found in renal tumours; so that we have to consider not only simple sarcomatous and carcinomatous tumours, but a number of different varieties in each class, and some which bear such close resemblances to more than one class, that it is difficult to assign to them their exact place in a purely histological classification. There are, however, only a few of these tumours which are common, and a still smaller number which are suitable for surgical treatment, and it is to these, that I shall chiefly direct your attention, though we cannot afford altogether to forget the rarer forms, especially when engaged in the difficult task of differential diagnosis.

Simple Neoplasms.

Fibromata—Inflammatory.
Simple.
Cystic.
Muscular.
Fatty.
Lipomata.
Hæmatangiomata.
Osteomata.

Adenomata—Papillary.
Glandular.
Papillomata.

MALIGNANT NEOPLASMS.

Sarcomata—Spindle-cell.
Round-cell.
Alveolar.
Adenoid.
Muscular.
Myxomatous.
Lymphadenomata.
Carcinomata—Encephaloid.
Scirrhus.
Colloid.
Epithelioma.
Cylindroma.

OSTEOMATA AND HÆMATANGIOMATA.

Of these I have nothing to say; the very occurrence of true bone tumours is doubtful, and the small vascular tumours, which resemble telangiectasis of the liver, have never been seen of sufficient size to render them surgically important.

The fibromata and lipomata are much more important, as they have already furnished material for some striking surgical triumphs.

We need not consider the small inflammatory nodules (*nephritis interstitialis tuberosa* of Virchow), as they are mere curiosities.

SIMPLE FIBROMA AND FIBRO-LIPOMA.

The simple fibroma, often attains a great size, and so do the mixed forms. The fibro-cyst, which furnishes the largest specimens, is probably always a degenerative form of the simple fibroma, the cavities being the result of breaking down of central portions of the growth.

The tumours in which there is an admixture of muscular tissue, also attain an enormous size (myo- or rhabdo-fibroma). Those in which fat is present are like the cystic tumours, products of

degenerative change in the simple fibroma; they often also attain a very great size.

Bruntzel removed successfully a simple fibroma weighing over 37 lbs.

Thomas a fibro-cyst weighing 10 lbs.

Wilks records a post-mortem at which a tumour variously diagnosed during life, proved to be a specimen of the degenerative fibro-cyst.

Billroth operated unsuccessfully for a fibro-myoma which weighed 40 lbs.

Spencer Wells successfully removed two fibro-lipomata, weighing 16½ and 14½ lbs. respectively, and tore away a third of one kidney, with one of the tumours. The portion of kidney removed was not affected by the disease, and the formation of fat was found by Eve to be secondary, *i.e.*, a degeneration of the fibrous tissue.

Fatty Transformation of the Kidney,

as recorded by various pathological observers, is a totally different condition, due to increase of fat in the adipose-areolar tissue, which pushes its way into the kidney through the hilum; it is usually the result of suppurative disease in one kidney. Its only surgical importance arises in a case in which the other kidney becoming the seat of some disease, curable by surgery, the patient practically only has one kidney, and the surgeon should be able to recognise the fatty transformation of the opposite organ, by abdominal exploration.

Etiology.—Nothing is known as to the causes which produce these simple tumours.

Symptoms—But little is known as to their symptoms; probably they are so slow in growth that they produce no symptoms till their size becomes a source of discomfort, or a cause of damage to the affected, or to neighbouring organs, by their weight and pressure.

Diagnosis.—Their recognition must chiefly depend upon their evident connection with the kidney, their slow growth, and the absence of symptoms above referred to. It may be quite im-

possible to make a differential diagnosis between one of these slow-growing simple tumours, and certain slow-growing sarcomata, to which I shall direct attention shortly.

Treatment.—When they attain a sufficient size to make them a serious inconvenience, a source of danger to the kidney they are attached to, or to other organs, they may be removed by abdominal section, either with or without the kidney from which they grow, according to the closeness of their connection with the organ. It is obvious from Wells's case, that some of them are so loosely connected with the kidney, that they can, with care, be entirely separated from it.

Adenomata.

These are of two kinds, the papillary and the glandular; the former commonly projects from the lining membrane of the tubules and Malpighian capsules; the latter is more common in the cortex. It is very rare for either to attain a size to call for surgical interference, but cases have been operated upon by Czerny, Schönborn, and Weir; the kidney removed by the latter weighed twenty-one ounces.

With such small material to hand it is obviously impossible to lay down any rules to guide diagnosis, and the etiology is mere speculation.

I have put them in a group by themselves, because their minute structure closely resembles that of the ovarian adenomata, and these latter growths are certainly on the border-land of malignancy.

Papillomata.

I have operated successfully in a case of hydronephrosis, which was found after the removal of the kidney, to be due to a combination of papilloma and calculus, at the pelvic end of the ureter. From the way in which the stone was hollowed out, and capped the papilloma, it seems probable that the growth was the primary disease; from its position it interfered with escape of the urine, and produced hydronephrosis, the obstruction to the outflow of the urine from the kidney leading to a deposit of its salts on the rough surface of the papilloma, and the gradual for-

mation of the calculus, which then more effectually blocked the ureter. I show you here a drawing of the specimen when fresh, and also the specimen itself, No. 3638 D, from the museum of the Royal College of Surgeons.

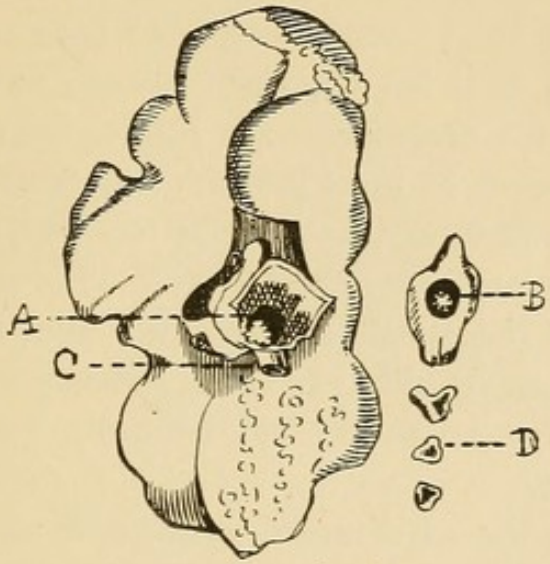


Fig. 16.

Hydronephrosis due to Papilloma and Calculus. Case 9 (Author's Table).—A, Pelvis laid open, showing Mouth of Ureter and Papilloma. B, Stone from Pelvis with centre Cavity, containing part of Papilloma. C, Ureter. D, Small Stones from Calyces.

Sarcomata.

The next group which claims our attention is a very important one, for the sarcomata are not only among the commonest of renal tumours, but also the most varied in their clinical characters, some being so malignant that they should never be touched, while others are so slow in growth, so slow in invading neighbouring parts, and so slow in recurring, if they ever do recur, that they present the most favourable cases for successful surgery.

I shall not attempt to enter into a minute discussion of the various kinds of sarcoma, of the ages at which particular kinds are most likely to occur, or of the exact duration of life, that may be expected in a patient affected, with one kind or another.

Those who are curious in such matters will find some interesting information in Newman's last lecture.

One important fact, however, strikes the surgeon at once, when he gains any practical experience in the diagnosis of renal tumours; it is that renal sarcoma is commoner in children than in adults, and is also usually in them of a very malignant type. I have never myself operated upon a child for renal sarcoma. I have refused to do so several times, and I have seen several such operations, and each has impressed strongly upon my mind the uselessness of the procedure. My reading has further enforced the lesson, for even in cases in which the tumour was attacked early, and was easily and successfully removed, speedy and fatal recurrence has been the rule; and as in other recurrences, after operations for abdominal sarcomata, the recurrence is often so terrible in its universality, and in the suffering it causes, that it is far better to let the patient die, gradually exhausted by the original disease.

With adults the exact reverse seems to be the case; in them renal sarcoma is often of slow growth, is slow in invading neighbouring tissues, and is also slow in recurrence. The difference is to be sought, first in the varieties of sarcoma most common in early life and in the adult, and secondly in the portion of the organ first invaded by the disease. In children the cell element predominates, the intercellular substance being soft and full of fluid, and the cells approach more nearly to the embryonic type; in the adult, though the round-cell variety, which is in most situations more prone to recur than the spindle-cell, is the common form of the disease, the tumours are hard, owing to the large amount of dense intercellular substance, and they are slow of growth. In children, too, the whole organ is much more often infiltrated, while in the adult the disease commonly attacks the capsule, and frequently never invades the secreting structure at all. Primary sarcoma is usually congenital; myo- or rhabdosarcoma is essentially so, the striated muscle-cells being, according to Cohnheim, included in the fœtal kidney when it is still rudimentary.

I have operated for sarcoma in the adult five times. I have

refused to operate in several other cases, in which the disease had obviously extended into neighbouring tissues, and I have once been refused permission to operate, in a case which was afterwards proved by post-mortem examination, to have been a

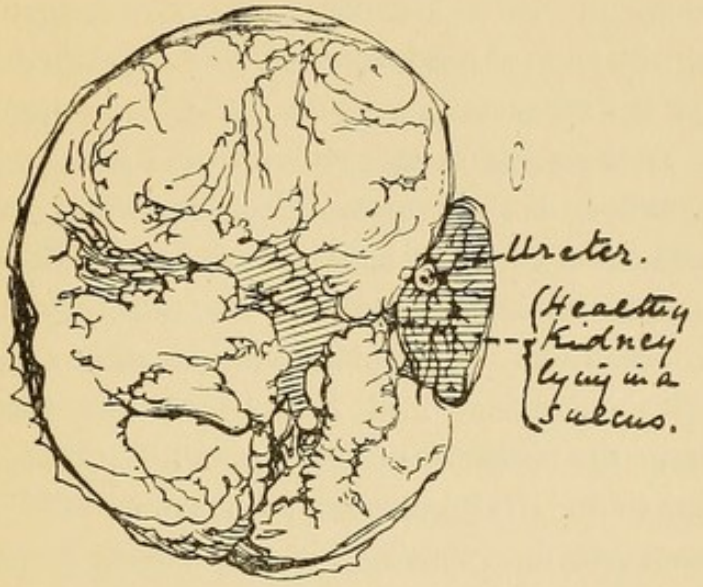


Fig. 17.

Sarcoma of the Capsule or of the Supra-renal Capsule, successfully removed by Abdominal Nephrectomy in February, 1883. Patient still alive and well. R.C. of Surg. Museum, 3597.

singularly favourable one for successful surgery. Of the five patients I have operated upon, three recovered and two died; one remains well six years after the operation;* the two others are both well some months after operation, but the time is too short to say anything as to their chances of permanent recovery. In one of them, however, the tumour is such an exact counterpart of the one removed from the patient who has remained well six years, that I think there is every chance of a similarly good result. Four of the patients were females, aged respectively fifty-three, twenty-five, forty-two, and thirty-six, and the fifth was a male, aged twenty-two.

* I show you here the specimen No. 3597 from the museum of the Royal College of Surgeons, and also a drawing of it.

The two large tumours already referred to, as being so much alike, had not involved the kidney at all; in the one case the healthy kidney lies, as you see, in a cleft of the tumour, and in the other it was pushed down almost into the iliac fossa, and when I first felt it in this situation, I thought it was a lobule of the new growth. The first of these was on the right side, and the other on the left. Mr. Eve, and Mr. Targett, who have kindly examined the specimens, suggest that they are possibly tumours of the supra-renal capsule, the cells having the peculiar columnar arrangement of the cells in that organ. Of the first, Mr. Eve writes, "The tumour was composed of spheroidal, finely granular cells, with large nuclei; the cells were closely approximated, having in places an indistinct arrangement in small columns. The blood-vessels and capillaries were excessively numerous. The capsule of the kidney is continued over the surface of the tumour." This latter statement seems to me a little difficult to reconcile with the notion of a supra-renal growth. The age of this patient is wrongly stated in the museum catalogue as twenty-eight; she was fifty-three. The other patient was thirty-six. She had had both ovaries removed by Dr. Keith, six or seven years before I saw her, and the tumour had not been noticed then, for twelve months before I saw her she had been again under Dr. Keith's care, he having diagnosed the tumour as an enlarged spleen, and treated it by electricity. She presented another curious pathological condition, her whole body being thickly covered with long, dark, soft hair, which had grown after the oöphorectomy. I had the abdomen shaved, but the hair grew again very quickly, and was a source of great trouble during the after strappings and dressings. She also had hair on the chin and upper lip, just like a dark man.

The first fatal case, No. 12, in my nephrectomy tables, was that of a ycung lady, aged twenty-five, the wife of a Spanish Prefect. She came from Teneriffe, and though I was against operation, I allowed myself to be persuaded into an exploration; then the tumour seemed so capable of removal that I went on, and only found out too late, that it had penetrated the

diaphragm and pleura. I had to remove a large piece of the latter, and the patient only lived a short time after she was placed in bed. There were evidences of similar disease in other abdominal organs. The tumour weighed 10 lbs., after much blood and serum had drained from it, and was a cysto-sarcoma, the solid parts being of a mixed kind—round cells, myxomatous tissue, and an immense development of large, thin blood-vessels. She noticed blood in her urine during her second pregnancy, eighteen months before the operation, and the tumour was discovered soon after, being then about ten inches across; it was painless, hard, and mobile. It grew slowly till within two months of the operation, and then suddenly increased with great rapidity, apparently from the worry and fatigue of nursing a sick child, the increase being accompanied by severe pain, renal and sciatic. About a week before I operated, an internal rupture of the tumour evidently took place, causing a sharp attack of diarrhœa, and a flattening and hardening of the upper part of the tumour. She had had a similar attack some time previously, and I think the secondary growths, which were apparent at the operation, dated from this first rupture.

The other fatal case was that of a married woman, aged forty-two, mother of two children. There was a history of phthisis in the mother's family, and two of the patient's brothers had died of it, but there was no history of tumour, or of cancer. She had first noticed blood in the urine, shortly after the birth of her first child, fifteen years before I saw her; the hæmaturia recurred from time to time, and there was constantly more or less pain in the right loin; for twelve years she had been conscious of the presence of a lump in that region, which she was told was a "floating kidney." Four years before I saw her she fancied there was a second lump behind the first, and the whole mass then became more fixed. It was still growing slowly; the bleedings were, however, frequent and severe, and the pain constant. The patient was very thin and anæmic, and there was some softening of both apices. I operated on October 19th, 1887, and removed the kidney without any unusual difficulty; it weighed 3 lbs. 5 ozs. The growth had evidently commenced in the capsule near the

hilum, and early invaded the interior of the pelvis. It was chiefly composed of spindle cells, but the softer parts contained many round cells. The patient never thoroughly rallied from the operation, and died in twenty-four hours.

The history of the first of these cases is sufficiently long to make it probable, that an early operation might have saved her. In the last case the slow growth, with no sign of infection of other organs, in spite of the early hæmorrhage, shows, I think, clearly, that a successful result would have attended operation, at any time before the kidney became fixed by extension of the growth into the surrounding structures, and the health broken down by repeated hæmorrhages and constant suffering.

The fact that this case was diagnosed as a "floating kidney" suggests that when a floating or moveable kidney is found to be unusually hard, and slowly increasing in size, especially if there be also hæmaturia, it should be explored by abdominal section and at once removed, if found to be the seat of new growth.

If we now attempt to summarise our imperfect knowledge of renal sarcoma, we find that it is most common in children, is in them often congenital, in this case going on to a rapidly fatal termination, from quick increase in size, involvement of neighbouring tissues and organs, and general marasmus; that when it makes its appearance later, but still in childhood, it runs a much more rapid course than in the adult, more speedily involves surrounding tissues, and is therefore rarely seen at a time when operation can be undertaken with any reasonable chance of completely eradicating the disease; that even when detected quite early, and before there is any sign of its having involved the other tissues, its removal is commonly followed by such speedy recurrence that the operation is barely justifiable. Such recurrence, moreover, is very extensive in its outbreak, and usually leads to an amount of suffering, altogether beyond that which is seen, when the disease is allowed to run its natural course in the kidney. Turning now to the adult, we find that the disease is most common in the middle period of life, is usually slow and insidious in its early course, and frequently progresses slowly, and often painlessly, for years, before it spreads beyond

the kidney; a certain amount of aching and pain in the situation of the affected kidney, occasional attacks of hæmaturia, and a hard swelling in the renal region, which is from its weight apt to become more mobile than a normal kidney, and is therefore likely to be regarded as an innocent condition, being the only symptoms which are at all common. It is worthy of special note that with the two large tumours of the capsule (or of the supra-renal capsule) there was no hæmorrhage; indeed, the only symptom in each case was the tumour, till its size caused indigestion, nausea, etc. There was never any urinary symptom in either case, to direct attention to the kidney. In the first I operated believing the tumour to be ovarian; in the second, with a larger experience in abdominal diagnosis, I at once felt sure that it was a tumour of the kidney, though led away from this diagnosis by having it sent to me as a case of enlarged spleen.

In the fatal case in which the hilum was early involved, hæmorrhage was the first symptom, and it is worthy of note that where there is hæmorrhage there is usually more pain. Slow growth with absence of pain, and absence of bleeding, seem to be the symptoms of sarcoma of the capsule, as distinguished from sarcoma of the body of the organ, or of the capsule when the growth early invades the pelvis. The method in which the sarcoma cells grow in their relation to the kidney varies greatly in different cases, but they are usually, at any rate in the early growth, encapsuled; in some cases, however, they infiltrate the whole organ. When they start in the renal capsule, the new growth may entirely surround a healthy kidney, or may push it aside, or merely close it into a groove, as in the specimen on the table (fig. 17), or the new growth may push in at the hilum, and expand the kidney, as a thin layer over the neoplasm. Sooner or later the capsule, when present, is broken through, and the cells become diffused in the renal or in the circumrenal tissues.

Diagnosis.—The tumours most likely to be mistaken for renal tumours are: Retro-peritoneal cysts; often quite impossible to diagnose from hydronephrosis. I have just operated upon a case, at the Samaritan Hospital, which illustrated this well, as I pointed

out before operation. Omental cysts; easier on account of the different relations of the bowel. On the right side, distended gall-bladder, when surrounded by adhesions, quite impossible to differentiate in some cases from renal tumour; when free and mobile, its exact relations are easier to define. Enlargement of the spleen; this ought not to be mistaken for renal tumour: first there is the notch always to be found with careful search; then there is the hard, sharp border, quite different from any renal tumour; then the percussion is dull to the very edge of the tumour; the intestine never overlaps unless it is adherent, which is very rare. Ovarian tumour; I have already pointed out the differences under hydronephrosis.

I can imagine that a sub-peritoneal fibro-myoma uteri might be very difficult to differentiate from a renal tumour, when the latter was large enough to dip into the pelvis, but I have not seen such a case. I have operated upon solid sarcomata of the mesentery, and retro-peritoneal cellular tissue, which it was quite impossible to distinguish from renal sarcoma, till the abdomen was opened.

Lymphadenomata.

These growths are, though not uncommon in the kidneys, always a part of a general disease, and except in the matter of differential diagnosis, quite outside the province of surgery, so that I pass on at once to consider the much more important group—

Carcinomata.

The encephaloid variety is most common, then the scirrhus, then the colloid. Epithelioma and cylindroma are so rare as to be almost curiosities. We have, of course, nothing to do with the secondary forms of the disease, which attack both organs, but only with primary cancer affecting one kidney.

This is not nearly so common as sarcoma, and is essentially a disease of the adult, and occurs chiefly in people past the middle period of life.

Etiology.—Heredity, as in other parts of the body, is probably responsible for a goodly number of the cases of primary renal

cancer; the long-continued irritation of calculus I should place next, and then accidental blows and injuries. The primary disease occasionally affects both organs.

Symptoms.—These are a combination of the symptoms of calculus, of those of the early stage of tubercle, and of those of sarcoma. Pain and hæmaturia are constant and early symptoms in most cases; the bleeding is more continuous than in either stone or tubercle, and differs especially from that accompanying the former, in that it goes on during rest, and during the night. The pain radiates more in carcinoma than in sarcoma; in both there is the appearance of a renal tumour, but carcinoma is usually sensitive to touch, which is rarely the case in sarcoma. Carcinoma does occur in children, but probably the great majority of the cases which have been recorded, are really cases of sarcoma. I think Newman puts it well when he says, "The differences in the symptoms of sarcoma and those of cancer will be found to be one of degree rather than of kind." When the appearance of the patient begins to denote the presence of malignant disease, then the surgeon's chance is usually gone.

Pathology.—Renal carcinoma frequently infiltrates the whole organ, but it also occurs with the appearance of a capsule; this is however, deceptive, for microscopic examination shows that there is a gradual transition, from the cancer to the healthy renal epithelium, extending through the apparent limiting capsule. This was well seen in the only case of primary cancer that I have met with. The patient was a widow, aged fifty-three. Pain in the left loin, six months before I operated, was the first symptom; this was quickly followed by hæmaturia, which was excessive, large quantities of blood being passed each time she passed water; then a swelling appeared, and she went into the Middlesex Hospital, but left unrelieved. Loss of flesh was rapid. There was no history of tumour or of cancer in the family. The menopause occurred at forty-four, without trouble of any kind, soon after the death of her husband. There was one circumstance in her history which might have predisposed her to renal disease. From the age of twenty, she had a procidentia uteri, and unless she constantly wore a ring pessary, she suffered much from bladder irritation, often passing

water every five minutes. The operation was a difficult one, the omentum being extensively adherent to the enlarged kidney. The disease had invaded the peritoneal covering of the kidney at one point, and during enucleation a squirt of the kidney contents took place over the peritoneal tissue. I was doubtful whether I got quite clear of the disease at this point, and also round the renal vessels. The kidney weighed 1 lb. 6 oz. On section the new growth was seen to be chiefly in the pelvis and calyces, pushing the renal tissue aside, but invading it at the point named, and growing right through to the peritoneal surface. The pelvis of the kidney was filled with a tough old decolourised blood-clot. She recovered from the operation, but very soon began to suffer from sickness, and pain in the abdomen, and died of local, recurrence, a year and forty days after the operation, her sufferings during the last few weeks of life being very severe. On first making sections of the new growth in the kidney, I thought it was a case of alveolar sarcoma, but a more careful examination convinced me that it was encephaloid cancer.

Adding this case to the sarcoma cases, I have six operations for malignant disease, with four recoveries and two deaths.

I have now concluded my review of the various diseases of the kidney which may, under favourable conditions, be amenable to surgical treatment, and I have discussed the operations for the removal of calculus, and for the relief or cure of some of these diseases by puncture, or by incision and drainage. The diseases we have last considered, and the more advanced stages of hydronephrosis and of pyonephrosis, whether due to the presence of calculus, or to other diseases which give rise to obstruction, to the escape of the urine from the kidney, or to suppurative change in its tissues and cavities, can only be successfully dealt with by the complete extirpation of the organ; this operation we call nephrectomy, and it may be performed either by lumbar or abdominal incision.

Lumbar Nephrectomy

is essentially the same operation as lumbar nephrotomy, already described, but with the addition of the enucleation and removal

of the kidney through the lumbar incision. I have already pointed out the difficulty which may arise, from the small space existing in some individuals, between the last rib and the crest of the ilium, and the danger from a low attachment of the pleura to the last rib. I may illustrate this last danger from the case of

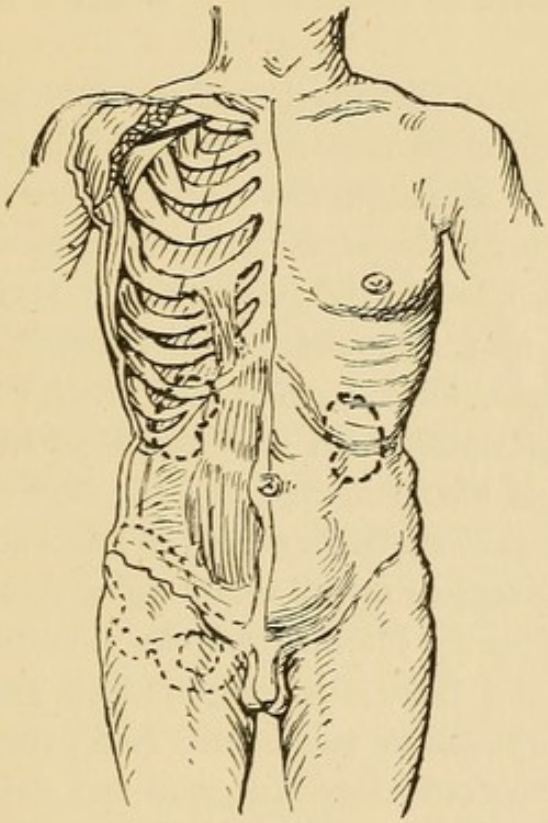


Fig. 18.
Diagram after Quain, with the Situation of the Kidneys marked by dotted outlines.

the young man whose kidney I removed for sarcoma. I operated by abdominal incision, and having examined the kidney from the abdomen, was in some doubt as to the exact nature of a large hard mass in its pelvis, and decided to open into the kidney from the loin, before proceeding with its extirpation. In making this incision, I have no doubt that I wounded the pleura, for air rushed freely in and out with a whistling noise, and I could feel the cool rush on my hand, though I could not exactly find the wound. The lung partially collapsed, and he suffered

during the early days after the operation, with pneumo-thorax and some pleuro-pneumonic symptoms, and the heart was displaced to the right side ; but he made a good recovery, and before he left town, I could detect nothing wrong with that side of his chest. If the accident may happen in making a small wound of this kind, it is certainly more likely to happen, when there is this low attachment of the pleura, with the large wound necessary for the extensive procedure of enucleating a kidney through a lumbar incision.

I have only once performed lumbar nephrectomy, and then under such peculiar circumstances that I shall give you the case at some length. It also illustrates a possible, and grave danger, in lumbar nephrectomy, the actual occurrence of which could not have been verified, but for the peculiarities I am about to relate.

In February, 1887, I performed a most difficult removal of the uterine appendages, for a married lady, whom I had been seeing for some time previously, with my friend Dr. Ferrier. The tubes were both full of bloody serum, and the matting of parts was so dense that it was impossible cleanly to remove the ovaries, and I was obliged to content myself with scraping them away as far as I could, and ligaturing bleeding vessels. She made a good recovery, up to the time of leaving her bed and going downstairs ; then she began to vomit after food ; this gradually grew worse, till she vomited everything, and was only kept alive by nutrient enemata. For more than a year she was a great source of anxiety, both to Dr. Ferrier, and myself. We had the advantage of the advice of Sir William Jenner, Dr. Broadbent, and others, but nothing stopped the vomiting, which came on regularly, without effort, about ten minutes after a meal. She was a perfect skeleton, and entirely confined to her bed. Two conditions, during this time, especially attracted our attention : First, menstruation recurred somewhat irregularly, but often profusely. This did not surprise me, as I was sure portions of the ovaries were left behind. Second, she had a mobile, somewhat large, hard, and tender right kidney. We constantly discussed these two conditions, the possible ovarian irritation, and the possible renal irritation, as the causes of her sickness. Dr. Ferrier, I think, naturally looked

to the imperfect oöphorectomy, as the *fons et origo mali.* I being able to find nothing wrong in the pelvis, and having seen similar cases of recurrence of menstruation, after imperfect removal of the ovaries, but without the sickness, was all along more inclined to blame the kidney. Suddenly the sickness ceased, she began to eat like any one else, and rapidly regained her health, menstruation then becoming tolerably regular. Still the kidney troubled her. After being fairly well for some months, the sickness began again, and was soon as bad ever; she was herself convinced that it was due to the kidney, which was now smaller, but still mobile, and very tender. I still held to the same opinion, and at last it was decided that I should reopen the abdomen through the old median wound, carefully explore the pelvis, and find out what was the exact condition of the kidney. I could find nothing wrong in the pelvis, except some slight bosses in places, which might be the remains of ovaries, or merely encapsuled ligatures. The kidney proved to be completely disorganised. I show it you here, shrivelled, and a mere mass of putty. I found that it was very adherent, and that it would be impossible to remove it through the median incision, without extending it to a great length, and as I had already opened the kidney to explore its interior, through a small cut in the loin, I determined to extend this into the usual lumbar incision, and thus remove the kidney. I found the operation much more difficult than the enucleation of a similarly adherent kidney through a lateral abdominal incision, though the very small size of the organ rendered it specially suitable for the lumbar operation, and there was some fouling of the deep parts of the wound with the kidney contents. After I had secured the vessels, and cleaned the wound, I utilised my abdominal opening for an examination of the peritoneal coverings of the kidney, and found that there was one tear which admitted my whole hand, and several smaller ones, through one of which some of the caseous material had passed into the peritoneum. Here, then, was distinct evidence of a danger, upon which I have always insisted in the lumbar operation. The peritoneal covering of the kidney may be torn without the knowledge of the operator, and blood, or other material, may find its way

into the peritoneum through such opening, and there is no possibility of knowing that it is there, or of removing it.

The patient made a rapid recovery, all sickness ceasing at once, and she is now in excellent health, though she still menstruates.

The objections to lumbar nephrectomy are—

1. The small space available for incision in most cases.

2. The danger of wounding a pleura with a low insertion.

3. The danger of wounding the colon or the peritoneum, and of fouling the latter, without being aware of the accident.

4. The possibility of not being able to find the kidney at all, an accident which has happened in a large number of cases, and to experienced London surgeons.

5. The possibility of removing a single kidney, without knowing that the patient has only the one.

6. The impossibility of noting the condition of the other kidney and ureter.

7. The fact that it is only suitable for a limited number of cases, it being impossible to remove much-enlarged kidneys, through any incision that can be confined to the loin.

The great point advanced in its favour is that, up to the present time, it has been more successful than the abdominal method Why? Simply because it has been the fashionable method, and the abdominal method has usually been a last resource, in cases which were too bad to be operated upon by the lumbar method.

Even so. Newman's tables show that there were twenty-one deaths in fifty-four fatal lumbar nephrectomies, from shock and collapse, against twenty in sixty-six fatal abdominal nephrectomies from the same causes.

I do not suppose any rational being will, in the present day make the mere opening of the peritoneal cavity a reason against abdominal section, and in favour of lumbar.

Newman is undoubtedly right when he says, "If the relative position of the two operations were reversed, the mortality of the lumbar operation would be much higher than that of the abdominal one now is."

That is to say, if the worst cases, and the malignant cases, were

operated upon by the lumbar method, the results would be worse than they are for the same class of cases now operated upon by the abdominal method.

There are, however, some conditions in which the lumbar operation may properly be performed, notably cases in which a lumbar incision and drainage having failed, the extirpation has to be undertaken with a fœtid sinus, already extending from the loin into the interior of the kidney; also in some cases of wound of the kidney, to which I shall refer later. It may, therefore, be well to describe briefly the steps of the operation which come after those already described for nephrotomy.

It will usually be necessary to lengthen the external incision to the full length admitted by the conformation of the individual, and sometimes to supplement it by a transverse or vertical incision, or even to resect a portion of the last rib. Various operators advise various incisions, but each case must really be dealt with on its own merits, according to the size of the kidney, the absence or presence of adhesions, and the configuration of the individual. When the kidney is thoroughly exposed, it must be enucleated from its adipose areolar capsule, or from its true capsule, according to circumstances. When reached, the vessels should be tied as close to the kidney as possible, *en masse* if they are normal, and separately if they are more numerous. The ureter should, whenever possible, be loosened from its bed, secured with forceps close to the kidney, and then ligatured farther off, a sponge being placed under it when it is divided between the forceps and ligature, in case a few drops of its contents should foul the wound. Its free end should be fixed in the lips of the external wound by a suture, or safety-pin, a rubber drainage-tube or two being placed alongside of it, and the wound closed round their mouths by a few points of interrupted suture, each including all the divided tissues. Before the sutures are introduced, the wound should be well dried with carbolised sponges, and then flushed with some warm antiseptic solution.

It is noteworthy that Newman's table gives seven cases of death from pyæmia and septicæmia. Four others which may well be due to the same causes, and eight in which the cause is

not given, should probably swell this list—all preventable deaths.

If the adhesions round the vessels are very dense—sometimes they are like cartilage—they must be carefully snipped through, bit by bit, with scissors, and the vessels tied together with some of the adherent tissue, rather than risk wounding the aorta or cava by too carefully dissecting them out.

A large, thick absorbent antiseptic dressing, secured by broad adhesive straps, or by a many-tailed flannel bandage, is then applied.

In 1883, I suggested a vertical incision, farther out than the lateral abdominal one of Langenbüch, so as to avoid opening the peritoneum, but I have only tried it once in nephrectomy, and twice in nephro-lithotomy, and I found it very difficult to avoid wounding the colon, and eventually opened the peritoneum close to its reflexion from the surface of the colon in both the latter cases. I have been so pleased with my results with Langenbüch's incision, that I wish for nothing better.

Abdominal Nephrectomy.

This operation may be performed by the ordinary median incision, but the lateral one introduced by Langenbüch, and made along the outer border of the right or left rectus, according to the kidney to be removed, is by far the best, as it not only gives a more easy command of the renal vessels and ureter, but it avoids almost entirely exposure of the intestines and general cavity of the peritoneum, during the operation, and it gives easier access to the outer layer of the mesocolon, through which the kidney should be approached, in order to avoid the vessels, which lie chiefly in the inner layer; thus, by operating through the outer layer, hæmorrhage is avoided, and the vascular supply of the colon is less liable to injury. The incision should begin just below the ribs, a narrow hand's breadth from the middle line, and be carried down for about four inches, so as to admit the operator's hand without bruising of the parietes. The *linea semilunaris* will usually be easily found, and when it is well marked there is but little hæmorrhage, even less than in making the

median incision. A few vessels will require forci-pressure, and one which crosses the line of incision, should be divided between two pair of forceps, and at once ligatured. If the sheaths of the muscles are much opened hæmorrhage may be rather free, but is readily controlled by forceps. After the division of the *linea semilunaris*, a little extra care is necessary, as the peritoneum is very thin, and large vessels frequently lie immediately under it, on the surface of the kidney. As soon as the peritoneum is open, the hand should be introduced, and passed over to the opposite side of the abdomen for the examination of the opposite kidney and ureter; the neglect of this precaution led me recently into a very serious dilemma. I was operating for the removal of a calculous pyonephrosis. The surface of the kidney was very adherent to the anterior parietal peritoneum, and I had to clear it before I could introduce my hand. Becoming absorbed in the operation, I forgot that I had not examined the opposite kidney and ureter, went on and removed the right kidney, and then remembered the omission. Judge of my dismay when, on passing my hand over to the other side, I found the ureter blocked, about half-way down, by a large calculus. I had reduced the abdominal operation to the level of the lumbar one. Had I found this stone earlier, I should have removed the stone from the suppurating kidney, instead of the kidney, then the stone from the other ureter, and waited to perform nephrectomy till the left ureter was healed, and that kidney in good working order. It was impossible to leave the stone blocking the only kidney, so I cut it out through a small lumbar incision, and watched the result with much anxiety. Urine flowed very freely from this wound, soaking the dressings and bedding of the patient, in spite of frequent changing. So far all seemed to promise well. Each day there was a slight increase in the amount of urine obtained from the bladder, and it was of good character, and the weight of the dressings showed a daily secretion of from thirty to forty ounces. Up to the fifth day all went well. On the morning of the sixth day she was seized with severe pain in the chest and difficulty of breathing; the temperature and pulse rose rapidly; she became dusky, then excited, and finally wildly delirious; moist râles meantime were audible all

over the chest, and in spite of lowering the temperature with dry cold to the head, jacketing the chest in hot poultices, and free stimulation, she rapidly sank from broncho-pneumonia, the kidney acting well to the last. I have not the least doubt that the illness was due to too great exposure of the wet skin surfaces when the dressings were changed. This, however, does not release me from the responsibility of my neglect, in not satisfying myself as to the condition of the left kidney, before I had committed myself to the removal of the other. When the healthy condition of the kidney and ureter is assured, as far as it can be, by intra-peritoneal palpation, the hand is withdrawn, and a flat carbolised sponge is introduced, to keep back and cover the intestines; then a small opening is made in the outer layer of the mesocolon, and enlarged by tearing; through this opening the size and condition, as to adhesions, of the kidney are estimated. If the parts are normal, the fingers can be gradually insinuated under the peritoneal covering till the aorta is reached; from it the renal artery can be traced, and then the vessels can be ligatured before the kidney is enucleated, the enucleation being thus rendered easier, because it is almost bloodless. The vessels must be secured on their renal side, by pressure forceps, before they are divided, or very free hæmorrhage may occur from the kidney. When, on the other hand, there is much inflammatory thickening of the tissues and adhesion, the kidney must be enucleated before the vessels can be reached and cleared. In old-standing cases of pyelitis, or pyonephrosis, the adhesions about the vessels and hilum are often extremely dense and thick, so that the renal vessels can only be discovered when they are cut across and bleed, and can only be secured by running a needle armed with silk under their mouths, in this dense tissue. I used always to clear the vessels first, and secure them by a pair of Wells' large pressure forceps, but after fourteen successful cases, I had the misfortune to include a small piece of the vena cava in the forceps, and after tying the renal vessels, cut out a small V-shaped piece of the wall of this important vein, and the patient bled to death. This terrible accident made me abandon this method, except, as I have said above, in cases in which the tissues are normal—not a

very common condition in nephrectomy—and I now never use the big forceps. I, however, again met with such extensive adhesion around the cava, that I actually dissected it entirely from its attachments for about two inches, before I could get a good hold on the renal vessels. The patient made an excellent recovery (Case 18).

The exact method to be employed in ligaturing the vessels is not of much consequence. When I can, I transfix and tie the vein and artery separately; in other cases I pass the silk through some part of the tissues above the vessels, to prevent slipping, and tie *en masse*. I have already mentioned the method adopted in very dense adhesions. I usually apply a separate fine ligature round the whole pedicle, before dropping it. During enucleation, each bleeding vessel should be secured by a pair of small pressure-forceps, and well-wrung sponges should be pushed down between the kidney and the capsule, as successive portions are enucleated. The last part to separate is the ureter, and, before separation, its renal end should be secured by pressure-forceps, then a ligature tied a little way from the forceps, and a sponge placed under it before it is divided. Whenever it is possible, I enucleate it for some distance from the kidney before dividing it, so that its cut end, with the sponge under it, may be at once drawn outside the abdomen; and I afterwards fix it in the lower angle, or most convenient part of the abdominal incision, with a cleansed safety-pin. I regard this fixing out of the stump of the ureter as the most important detail in the operation, and in every case in which I have been obliged to cut it off deep in the wound, I have had distinct evidence of suppuration and trouble round it.

The case of sarcoma, still living, six years after operation, nearly lost her life from this cause, the greater part of the ureter being discharged as a slough, after her return home. Before I ever operated, I came to the conclusion that the dropped ureter was one great cause of mortality, and I am constantly strengthened in that opinion. The objections which have been raised to the proceeding are purely fanciful, as any one who considers the anatomy of the parts will see. A ureter brought into Langenbüch's incision, through the outer layer of the mesocolon, cannot be a band

crossing the peritoneal cavity; it is, at the worst, only a slight ridge, travelling over a small surface of the outer abdominal wall. As a matter of fact, I have no doubt that it quickly atrophies and disappears, as did the much thicker ovarian pedicle, in the days when it was fastened up in the clamp. The open end of the ureter should be cleansed with tr. of iodine, or other strong antiseptic, especially if there is to be a glass drainage-tube projecting near it for it sooner or later always becomes putrid, the bladder urine also becoming offensive at the same time. Care must also be taken that it is not left too long and protruding, or it may herniate, as the ovarian pedicle was apt to do, and then is very troublesome. I once nearly lost a patient from hæmorrhage, through clipping it off under these circumstances. The stump receded, and I could not control an artery which spouted in it.

When the renal vessels and ureter have been secured, all the other divided vessels should be tied with fine carbolised silk, the sac carefully sponged out, or, if there is any suspicion of it having been fouled by kidney contents, flushed out with solution of corrosive sublimate (1 : 2000), the surfaces carefully examined for oozing points, and a large, well-wrung sponge pressed to the bottom of the sac, while the abdominal sutures are introduced. If this sponge comes out fairly dry, and but little blood-stained, and *if the operator is absolutely certain that no fouling of the sac has occurred with the kidney contents*, its edges may be allowed to drop together, and the abdomen closed without drainage. Six of my cases have recovered without any drainage. It is not necessary, or *advisable*, to suture the edges of the sac, because the torn tissues inside it do not absorb readily, and if any oozing occur, or effusion of serum, suppuration from tension may result; whereas, if it is left open, the fluid will overflow into the peritoneum, and be rapidly absorbed, leaving the solid blood-clot to organise. If there is fear of oozing, or the least doubt as to the perfect asepticity of the operation, it is better to drain. I prefer a Keith's glass tube, projecting from the abdominal incision, with sponge-dressing, and clearance every twelve hours under the spray, to rubber tube or tubes through the loin, as the latter add to the discomfort of the patient, and entail moving at the dressings. I have, in some very

bad cases, used both kinds, and should always put a rubber tube into the loin-opening if, for any reason, one has been made.

I have advised against sewing the edges of the sac together. I strongly advise that it should not be sewn up into the wound, as this is very apt to cause awkward kink in the colon. I have already referred, in Lecture II., to the case of the lady from whom I removed a conglomerate cystic kidney, the other kidney being in an earlier stage of the same disease. I unfortunately departed from my rule in this case, because the cæcum seemed very large, and to lie awkwardly, and I feared obstruction. The suturing up to the incision produced the very evil I dreaded; she got acute obstruction. I reopened the wound, performed enterotomy, and emptied an enormously distended cæcum on the fourth day, but the obstruction continued, and she died on the fifth day. It was a most unfortunate termination to the case, but very instructive in two ways: first, as to the sewing up of the capsule; and second, as to the power of a single kidney, already advanced in multiple cystic disease, not only to carry a patient through a serious nephrectomy, but also for some days through an attack of acute obstruction, and then through a second operation, involving enterotomy. The urine before the operation was of low specific gravity, albuminous, and sometimes contained a little blood, and when I saw the state of the second kidney, at the operation, I greatly feared suppression. This case and the one I have detailed, in which I removed a stone from the other ureter, both dying of accidental diseases, apart, to some extent, at any rate, from the operations, are the most disappointing I have ever met with in surgery.

After Treatment.—I treat the cases after operation, exactly as I treat all other abdominal operation cases, except that I allow no opium in any form. I have seen a very small dose immediately check the secretion from the remaining kidney, to an alarming extent, and I have seen alcohol act to a less extent in the same direction, so that I avoid stimulants also, unless the risk of withholding them seems greater than the risk of giving them. When a sedative is absolutely necessary, I give bromide of potassium and chloral, in the rectal injections; but, as a rule, the pain after renal operation is not very severe or prolonged, and patients do quite

well without a sedative at all. Sickness is often very prolonged and troublesome. With some patients 15 gr. doses of oxalate of cerium in mucilage, frequently repeated, are beneficial; in others this drug seems to have no effect. If the sickness continue beyond the third day, I give a few doses of white mixture, and aid its action by a small enema, and this is generally efficacious. In the absence of vomiting, I keep the bowels quiet for a week, as any disturbance in the colon must affect the intra-peritoneal wound injuriously. The point in the abdominal incision at which the ureter is fixed is generally slow in healing, and in two tubercular cases I have had a spreading ulceration round it, which threatened to be troublesome; but I now treat the ureter with tincture of iodine, and then with strong corrosive sublimate lotion, and in some of the cases it has after this remained sweet, and healed quickly.

There are many points which I should like to illustrate from my case-books, but time will not allow me to do more than summarise the reasons which, I think, tell in favour of abdominal nephrectomy—reasons which are constantly supported and enforced by the experience of the operating table.

The occasional absence of a second kidney, the knowledge that in one case at least (Polk's) a single kidney has been removed, the error only being discovered after the death of the patient, the importance of knowing exactly the condition of the other kidney and ureter, and the greater convenience and precision of the abdominal method, seem to me to indicate its use in all but some exceptional cases, to which I have already referred. In speaking of the disadvantages of lumbar nephrectomy, I have shown why the statistics of the lumbar operation have been better than those of the abdominal, and in my paper on "Twenty-five Abdominal Nephrectomies," read before the Royal Medical and Chirurgical Society, this year, I have reversed the argument, by showing in this consecutive series a mortality of only 20 per cent., just about half what Newman's tables show as the mortality of lumbar nephrectomy, and considerably less than half if the same class of cases that I have operated on are only included.

I do not advocate the performance of abdominal nephrectomy by

every tyro in surgery, neither do I recommend such to undertake any serious abdominal operation ; but I do unhesitatingly affirm that, as a precise and scientific operation, there is no comparison between the abdominal operation and its lumbar rival.

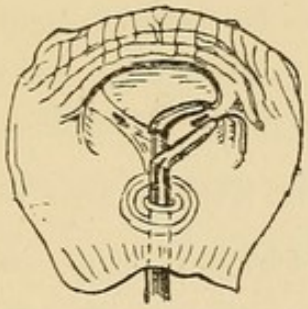


Fig. 19.

Tuchman's Forceps applied to compress Bladder opening of left Ureter.

Diagnosis: Examination of Urine, etc.

It is necessary to say a few words about the examination of the urine, and the estimation from this, and from other sources, of the probable condition of the opposite kidney. I do not attach so much importance to this question of the secreting power of the other kidney, as is done by most writers on renal surgery. I have elsewhere pointed out that a kidney which can carry on its work, hampered by serious disease and suppurative changes in active or chronic progress in its fellow, is not very likely to fail when this source of trouble is removed, and it has thrown upon it some extra work permanently, and some only during the early days of wound repair. My experience proves that suppression is not to be greatly feared in aseptic cases, and the case of conglomerate cyst, also described, is a striking support to my contention. Still, it is well to have the urea estimated several times before operation, taking the whole quantity of urine passed in each twenty-four hours. Mr. Malcolm, who does this part of my work, prefers the hypochlorite of soda method.

Low specific gravity, constant presence of albumen to any amount, and, worse still, the presence of casts, are indications not to be neglected.

I have already spoken of catherisation of the ureter, and of the endoscope. Tuchman's forceps, applied to the mouth of one ureter, I figure as a warning (fig. 19). There are various other contrivances for obtaining the urine from one ureter. I believe they are all nearly, if not quite, as dangerous as a properly performed abdominal nephrectomy, and I leave it to those who believe in these aids to surgery to learn their use from other sources.

Injuries of the Kidney and of the Ureter.

On this subject I must be brief, as my lectures are already longer than they should be; this brevity is not a matter of regret, however, because I have had but little practical experience in these traumatic affections, and that little experience, together with a study of published cases, leads me to conclude that injuries of the kidney, and of the ureter, only require to be treated on sound surgical principles, to yield a very large proportion of success; and any one who is well grounded in sound surgery, and especially any one who has taken to heart the lessons which I have endeavoured to put practically before you, as to the surgical treatment of the diseases of the kidney, can have no difficulty in applying both to the treatment of its injuries. The kidneys are liable to be bruised, contused, shaken from their normal seat, crushed, ruptured, torn, cut, and penetrated by shot or bullet. The ureters are liable to be violently stretched, torn across, or to have holes made in them by knife, shot, or bullet. They are also liable to be damaged by the surgeon, in the performance of abdominal operations, and by the accoucheur, in delivery by the forceps. Most of these injuries may occur, both to the kidney and to the ureter, without external wound; others, such as those inflicted by stab or gunshot, always have an external wound, to guide us as to the seat, and as to the probable extent of the injury. That such injuries have been very fatal in the past, is shown by the statistics of Maas and Otis, fifty deaths having occurred in ninety-eight cases; *i.e.*, the mortality from

traumatic lesions corresponds very closely to that following surgical procedures, for the various diseases we have been considering. Let us hope that, as my results in abdominal nephrectomy show a reduction of mortality to 20 per cent., so in the new era which has dawned upon abdominal surgery a like reduction may occur in the mortality from traumatic lesions. Bruises may lead to abscess, as shown by the case I gave you in my first lecture; the accepted new pathology of suppuration shows, that the presence of organisms is necessary to its development. I have already pointed out that the organisms are especially likely to be present in the kidney, therefore anything which lowers the vitality of a portion of its tissues sufficiently, may allow the pathological changes which we call suppuration. Such bruises may happen without external sign, or, at any rate, the changes in the kidney may be more rapid than the slow changes in the colour of the integuments, which denote to us a deep bruise. Contusion may happen by general violent shake of the body driving the kidney against the spine or ribs; such injury, again, may conceivably cause suppuration, and there will be no external evidence that the kidney has suffered.

Similar accidents may shake the kidney from its usual firm embedment, and when this loosening occurs from violence there must be some tearing of the perinephric tissues and some effusion. This may be absorbed, or may cause suppuration around the kidney, so also any of the injuries which may cause suppuration in the kidney itself may cause peri-nephric suppuration.

Crush of the kidney is one of the more common traumatic lesions, from the frequency of cart or carriage-wheel accidents; in this case the kidney may be merely bruised or contused, or it may be seriously lacerated; in either case blood may appear in the urine. I was once, when in country practice, called to see a fine, strong, young farm-labourer, who had been run over by a waggon loaded with coal. There was the distinct broad mark of the wheel right across the middle of his body, and yet the only injury he suffered was some bruising or laceration of the left kidney. When I arrived, an hour after the accident, he had been brought home

and put to bed. I found him cold and collapsed, with a small, slow pulse. Seeing where the wheel had passed over him, I at once asked if his bladder was full, or empty, at the time, and if he had attempted to pass water since. I found that he had not passed water for some hours before the accident, and had not attempted to do so since. I percussed the bladder, and found it full; I therefore passed the catheter, and drew off over a pint heavily loaded with bright blood. It was clear that the bladder was intact, and I afterwards allowed him to pass his water. It remained bloody, but decreasingly so, for some days. I kept him in bed, and relieved the pain, which at first was severe in the left loin, by constant poulticing, and in ten days he was quite well, and so long as I knew anything of him, remained so. By such accidents the kidney may be altogether separated from its vessels and ureter, a condition which would be indicated by much more severe and complete collapse, by evidences of internal hæmorrhage, by diminution of the quantity of urine, but not necessarily by the presence of blood in it, as the torn ureter quickly contracting and curling over, no urine or blood may pass down it, from the moment of the accident. In such an accident the loss of blood may be so great, that a fatal result immediately follows, but if there be time, and the condition is suspected, the abdomen should at once be opened and searched. I once saw the spleen torn out in the course of an ovariotomy. No attempt was made to secure its vessels, yet the operation was completed, and the patient lived for some hours after being placed in bed, the post-mortem showing an enormous mass of blood between the layers of the lesser omentum.

If, on the other hand, only the parenchyma of the organ is injured, there is every probability that, with rest, cold applications, and proper care, the patient will recover. The bleeding from clean incised wounds of the renal tissue, as also of the liver, is very free at first, but tends to cease spontaneously; then clotting will take place; the serum will, especially if the injury has involved the peritoneal surface, be very rapidly absorbed; rest completes the cure. It might be thought that the oozing of urine from the torn surfaces into the peritoneum, or perinephric cellu-

lar tissue, would be a source of great danger, and in the latter situation it is a source of perinephric abscess. If the kidney is healthy at the time of the accident, the urine will not necessarily trouble the peritoneum. Of this I will give a proof from my own practice directly. Moreover, the amount of urine escaping is pro bably small. All that I have seen of incision into the renal tissue would lead me to conclude that the local injury inflicted on the nerves stops the secretion at the injured part. The urine oozing from a renal wound does not come from the parenchyma, but from the open calyx or pelvis.* Now, as to the damage likely to be caused by the presence of the small amount of healthy urine likely to flow from such wound into the peritoneum.

In the performance of my three hundred and thirty-fifth ovariotomy, I accidentally cut a piece out of the left ureter. I had some suspicion at the time, but could not find the cut renal end, and so closed the abdomen, hoping that I was mistaken. The microscopic examination of the lining membrane of the fragment removed showed clearly that it was ureter. The next morning I found a very free flow of clear fluid, which I thought had a slightly urinous odour, from the glass drainage-tube in the pelvis. Nearly twenty-four hours after the ovariotomy I made an incision over the left kidney, outside the colon, in the situation I have already referred to, as being a suggestion of my own, intending to remove the kidney, but fortunately came down immediately upon the cut end of the ureter; and as the ovariotomy had been a very long and serious one, I determined not to risk an immediate nephrectomy, but contented myself with turning the ureter out through a hole in the loin. Now, here is the point of the case: The peritoneum had been freely flooded with the whole of the secretion of one kidney; it was also open to the air through the drainage-tube, though protected by an antiseptic dressing, and yet it was not reddened, or in any way irritated, by its bath of

* I have just had a striking proof of this, in a case, in which owing to the high position of the kidney, I failed to reach and open the pelvis; the parenchyma was extensively cut and torn, and yet there was practically no oozing of urine from the loin wound.

healthy urine. That the urine was very healthy, was shown by the entire absence of skin irritation at its exit, when she came up for nephrectomy, which I performed successfully three months later. I have already alluded to the danger of injury to the colon in this special incision ; it was illustrated in this case. I made the incision through the one I had made when I found the ureter. After the removal of the kidney, I drained the loin wound with a rubber tube, and five days after the operation it had penetrated the colon, and there was a fæcal fistula, which, however, fortunately closed spontaneously.

Of course, if an accident should happen to a kidney already diseased, and pyoid or putrid urine flow either into the cellular tissue or peritoneum, the results would be immediately disastrous ; in the latter case probably the most speedy surgery, and flushing out and drainage of the peritoneum, would hardly save the patient.

Of course any injuries to the kidney may be much complicated by injury of neighbouring organs, but this is too large a subject to enter upon.

In one other case I had the misfortune to wound the ureter. I operated on a retro-peritoneal cyst, believing it to be renal. When I found out my mistake I had already gone too far to turn back, and had cut away a large portion of the ureter, and secured its two ends ; I therefore performed immediate nephrectomy. The inferior mesenteric artery was also divided and ligatured. A few days after the operation I discovered that there was no pulsation in either femoral, and it only returned three weeks later. Meantime the obstruction to the circulation, probably due to clot extending into the birfurcation of the aorta, from the ligatured mesenteric vessel, was evidenced by patches of gangrene on the toes, heels, and buttocks. The patient, however, made a good recovery, and I saw her in good health long afterwards, but have now lost sight of her.

If in rupture of the kidney, healthy urine escape backwards into the cellular tissue, the condition known as acute hydronephrosis is produced. Godlee has published some very interesting cases of the kind in the Clinical Society's Transactions.

Sympathetic suppression of urine may result from any of these renal injuries, but more commonly follows bilateral than unilateral injury. When it is present, the surgeon has to consider the possibility of both ureters being torn across. If a clot of blood obstruct the ureter after injury to the kidney, renal colic may be added to other symptoms.

Collapse, vomiting, hæmaturia, retraction of testicle, fulness and tenderness in the flank, ecchymosis of the skin over the kidney, and possibly suppression of urine, are the symptoms of serious injury.

Penetrating wounds of the kidney, from loin stab, have not been uncommon, and the literature of the subject shows that the kidney, or a portion of it, is apt to prolapse through the wound, and that the patients are very likely to recover when left to nature, or treated on the rough principles of the past. Everything in these cases will depend upon the injury being confined to the kidney, or implicating adjacent organs, such as the spleen, liver, or intestine. If there is the least reason to conclude from the symptoms that any such complication is present, the abdomen should be at once opened, the site of the injury thoroughly explored, the peritoneum cleansed, and any other necessary procedure adopted. If the kidney protrude, and is so much injured as to make its removal advisable, symptoms of other complications being absent, the wound may be enlarged, whether in the loin or abdomen, and the kidney removed, with the same precautions as are observed in performing nephrectomy by either method for disease. Severe local pain, accompanying injury to the kidney, is usually a symptom of extravasation of urine into the perinephric cellular tissue.

In deciding on the proper treatment to follow in any given case of renal injury, the chief points to attend to are the evidences of injury of other organs, the evidences of internal hæmorrhage, the evidences of internal escape of urine, and the possibilities of recovery, as evidenced by the general condition of the patient, if simple rest and care be the treatment.

Wound of the ureter may lead to acute hydronephrosis, and may be treated by immediate incision and drainage, and by more

remote nephrectomy if a fistula result; or if there be reason to suppose that the wound is small, it may be exposed and sutured, or the injured part of the ureter may be resected, and the healthy parts of the tube sutured together. Nussbaum succeeded perfectly with this latter procedure, for wound of the ureter during ovariotomy.

Time will not allow of the discussion of gunshot wounds; fortunately they are rare in civil practice; under any circumstances their discussion must be a somewhat barren one, for they are, of all injuries, those in which the greatest diversity may be expected, and therefore each case must be treated solely on its own merits. It must never be forgotten, that in any renal injury, the accumulation of blood and urine in the cellular tissue, around the ureter, may, by its pressure, obstruct that passage, as in Thompson's case of perinephric cyst, already referred to. The possibility of obstruction to the flow of urine, by accumulation of blood-clot in the bladder, must also be borne in mind. (See Rawdon's case, reported to the Medico-Chirurgical Society.)

So far as statistics are a guide, the mortality of nephrotomy and nephrectomy, for traumatic lesions of the kidney and ureter, and their subsequent results, compares favourably with that of the same operations for disease.

Gentlemen, with this hurried sketch of the nature and treatment of the traumatic lesions of the kidneys and ureters, I close my lectures. No one is more conscious of their imperfections than myself. The subject has grown, and is growing so rapidly with increased experience, that it already requires at least a dozen lectures to do it justice. I have endeavoured to make these lectures as practical as possible, illustrating by my own cases, and stating frankly my own opinions, rather than searching for those of others, and giving you a compilation. I can only say, in conclusion, that if you, who have so kindly and patiently listened to me, have learnt one-half as much, or derived one-half the pleasure from listening, that I have found in the preparation, I am amply repaid for my labour.

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Surgery of the Kidneys

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