SOME CASES OF NEPHRECTOMY AND NEPHROLITHOTOMY, WITH REMARKS.

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SOME six years ago I had the honour to bring before the notice of this Section the notes of one of the first successful cases then recorded in Dublin of nephro-lithotomy, remarkable also for the fact that the calculus was the largest removed from the kidney, unbroken, up to that date in Ireland, its weight in the dry state being 282 grains. Since then a fair number of these cases have come under my care, and I therefore considered the present to be an opportune moment to bring some of them under the notice of the Section, and see what changes the intervening six years have produced in the opinions I then gave utterance to.

CASE I.—H. W., aged twenty-eight, of good physique and very active outdoor habits, sent to me November, 1893, by Dr. H. F. Powell, of Nenagh, with the following history:—

For the previous three years he had suffered from recurrent attacks of pain in left lumbar region. These attacks were increasing in frequency and in duration of late. At first the pain lasted only for a few minutes; now for a week, or even longer, he suffers excruciating pain, and then, perhaps, has one or two months complete freedom. Vomiting is an occasional accompaniment of the pain, but is not constant.

Of late micturition has been more frequent, but not to any marked degree.

Urine, acid; sp. gr., 1018 to 1022; contains a trace of albumen, but neither pus nor blood. On examination patient is found to be a very healthy-looking, robust man, without the smallest appearance of invalidism about him. No enlargement of the kidney can be felt, and there is very little tenderness on

pressure. At time of examination he was absolutely free from pain.

The difficulties of an accurate diagnosis were explained to the patient, and after a consultation with my colleagues, Mr. Thomson and Sir Thornley Stoker, an exploratory operation was resolved on. The reality of the patient's sufferings was clearly proved by the eagerness with which he begged for an operation, though fully alive to its dangers.

On November 17th, four days after admission, I exposed the left kidney by the usual lumbar incision, and palpation giving a negative result, I thrust a fine needle into the convex margin, and after a little time succeeded in striking it against a calculus. The kidney was now raised from its bed and an incision very cautiously made into the pelvis of the ureter on its posterior aspect. Through this incision, with a little manipulation, the calculus I now exhibit was removed.

The wound was dressed in the usual manner, no attempt being made to close the wound in the ureter. For a few days some blood appeared in the urine, as is usual in these cases, but otherwise recovery was uneventful, and the patient was discharged cured five weeks after admission.

CASE II.—E. H., aged thirty-seven, by occupation a carpenter, was admitted into the Richmond Hospital on 3rd October, 1895, having been sent to me by Dr. Malone, of Limerick. This man's case was very interesting. In the previous May he had been first sent to me by Dr. Malone, who correctly diagnosed the presence of a renal calculus.

On examining him carefully I did not feel myself justified in recommending an operation, as his general health seemed good. There was neither pus nor blood in the urine, no tenderness on pressure, and although he had previously had several attacks of renal colic, each attack was followed by the discharge per urethram of calculus *débris*, and on one occasion a calculus the size of a pea, all of which he had carefully collected, and which, in my opinion, seemed to sufficiently explain all his symptoms. Medicinal treatment alone was carried out, and he was discharged from hospital after a short stay. I may add that he was rather hysterical, and very probably this biased my judgment somewhat. He was re-admitted five months afterwards, and his condition then was as follows:—

Pain persistently in left loin, and after micturition at the end of glans penis ; scalding pain in urethra ; no tenderness on pressure over kidney, no obvious renal enlargement.

Urine, total quantity in twenty-four hours, thirty-five ounces ; acid in reaction ; pus in large quantity ; no blood ; no sugar. Temperature normal. General health below par ; has lost flesh since last visit.

The only definite phenomena present were the pain in left loin, and in penis, and the presence of pus in acid urine. As a precautionary measure the bladder was carefully sounded for stone, with a negative result.

On the 11th October, eight days after admission, I exposed the kidney in the loin in the usual way, but found the kidney rather less accessible than usual. The calculus was easily felt with the finger, and the diagnosis confirmed with the needle. The stone was in the pelvis of the ureter, which was very thick and tough, so that it had to be cut into freely to allow the finger to enter and grip the stone.

The stone was fairly large, and evidently must have taken some years to attain its present dimension. The subsequent history was not so simple as in Case I. Patient complained of a great deal of pain, and hæmaturia was very marked for four days. He developed also a left pleurisy, which delayed his recovery somewhat. However, notwithstanding all these unpleasant manifestations, he left hospital perfectly well on 23rd November, six weeks after operation.

These two cases may be taken as samples of the simple type of renal calculus without grave complications, and without any difficulty in the operation procedure.

By way of contrast to these I will now detail some cases of a totally different type.

CASE III.—G. B., aged forty, labourer, admitted to hospital on 29th March, 1895, with the following history and symptoms :—Twelve years ago had an attack of right hemiplegia, from which he recovered with some weakness in leg. Until a week before admission was working in a bakery ; when carrying a basket of bread he slipped and fell, striking his side and left lumbar region against a corner of a wall.

Next day he noticed his urine contained blood, and later on it became turbid. He struggled on at his work for a few days more, but the increasing pain in the side forced him to give it up, and he sought relief in the hospital.

On examination he was found to be a man of poor physique, rather emaciated, with some paresis of right leg. On palpation a distinct fulness could be detected in the left loin, rather tender on pressure, but not markedly so. Has never had an attack of renal colic, but complains of pain in left side, no radiation of pain to testicle or thigh, and no retraction of testicle ever noticed.

His urine was acid in reaction, contained a large quantity of pus, but the notes do not give the sp. gr.

On the 11th April, fourteen days after admission, I exposed the left kidney by the usual lumbar incision. The kidney was large, soft and fluctuating. An aspirator soon demonstrated the presence of pus. The needle opening was enlarged, and the finger entered a large abscess cavity in the kidney. This was douched freely, and a drainage tube inserted. No stone could be felt in the cavity, and no further search was made for one. The patient derived no benefit from the operation. After a few days, notwithstanding the presence of the tube in the loin, pus reappeared in the urine, the temperature began to rise at night, and his general condition began to deteriorate.

After careful consideration I determined to remove the kidney, and, as the organ was very large, an incision in the left linea semi-lunaris was decided upon.

The nephrectomy was performed on the 11th May, and the removal of the kidney proved very difficult; it was very soft and friable, nodular in surface, and firmly fixed by adhesions to the parietes and adjacent viscera. Bleeding was very free, and was controlled with difficulty. The sac of the abscess was ruptured during the manipulations, and pus escaped into the wound and abdominal cavity. The pedicle was secured in the usual way, and the kidney which I now exhibit removed.

At this stage of the operation the patient developed symptoms of collapse, but under appropriate treatment he rallied, and the wound having been dressed he was removed to the ward. I regret to say that he died twenty-four hours afterwards, apparently from the shock and loss of blood.

On examining the kidney it was found to contain a calculus about the size of a hazel nut, and to exhibit the condition of

pyelo-nephrosis ; not one but many pus chambers existed in it. The supra-renal capsule was found to be firmly adherent to it, and possibly the collapse he exhibited was in part due to the unavoidable removal of this important organ.

It will be at once seen that this case differs very markedly from the others I have recorded, and looking back on the result I cannot hold myself quite free from blame.

In the first place, I believe that I should have continued the examination of the kidney for stone after I had opened the abscess cavity. Had I done so, I would assuredly have learned then that the kidney was the seat of many abscesses, and was, in fact, hopelessly disorganised. I need hardly say that the recognition of this fact would have been followed by the removal of the kidney there and then through the lumbar wound, this being enlarged if necessary.

In the second place, when I determined to remove the kidney, I believe now it would have been better surgery to have done it by reopening the lumbar wound, and if necessary carrying it well forward, and then adding a vertical incision three or four inches long to its anterior extremity. This would have permitted a much more easy removal, would have allowed the pedicle to be secured at an earlier stage, and thereby prevented some of the hæmorrhage, and would have allowed of the careful dissection away of the suprarenal body. I believe that had this method been adopted, the patient's life would have been saved, unfavourable though the case undoubtedly was.

The next case I will trouble you with was also a nephrectomy, but happily attended with a different result.

CASE IV.—Miss M. G., aged twenty-eight, a shop assistant, was admitted to the Richmond Hospital on the 9th December, 1895, having been sent in by Dr. Winifred Dickson, with the following history and symptoms :—When sixteen years of age was treated for uterine displacement and hysteria. Eighteen months ago, after

running violently to catch a train, she was awakened in the night by a severe pain of a cramp-like character in the right side, followed after some hours by vomiting. This attack, though lasting only four hours, left her so prostrate that she was confined to bed for some days. Since then at varying intervals has had recurrences of the pain and vomiting. Between the attacks she was completely free from pain until six months ago. Now has more or less constant pain of a dull, aching character, increased by exertion, especially by drawing a deep breath, slightly relieved by lying down. She informed us also that she sometimes felt a "lump" slipping up and down in the right side of the abdomen.

On examination patient was found to be a well-built young woman of good physique, and of good general health. A floating kidney was easily felt on the right side, freely movable, pressure on which caused a sickening pain. Urine was acid, sp. gr. 1020, contained no albumen or pus. I may add here that Dr. Winifred Dickson had recognised the floating kidney before the girl complained of feeling the lump, and had ordered her an abdominal belt. When this failed to relieve her Dr. Dickson sent her into my wards.

An exploratory operation, with nephrorrhaphy in view, was resolved upon. The usual lumbar incision was made, and the kidney exposed. On bringing it well into the wound it was seen to be cystic, and a rapid consultation was held as to the advisability of removing it. This was resolved upon, and it was without much difficulty separated from the peritoneum and its own capsule of areolar tissue, the pedicle ligatured by a transfixion ligature, *en bloc*, and the organ removed.

This kidney I now exhibit. There was practically no shock following the operation, but the subsequent history was not devoid of interest; twenty-four hours after operation blood appeared in the urine, which was very scanty, and the temperature rose to 103° F., with a quick, high tension pulse and a dry skin. The patient was very restless, and I feared she was about to have suppression of urine. A small dose of pilocarpine was administered hypodermically, and diaphoresis encouraged by doses of liq. am. acetatis and hot packing. This had the desired effect, and in a few hours a copious perspiration relieved all her symptoms. The total amount of urine secreted was carefully noted.

The operation was performed on the 13th December, and on the

following day only 17 ounces of urine was passed. The next day it was a little over 20 ounces. It gradually increased until on the 19th it was 33 ounces, on the 21st 44 ounces, and on the 22nd 52 ounces. From that on it varied slightly from day to day, the average being about 42 ounces.

The patient soon after left the hospital for the convalescent home, and is now, I am glad to say, back at her business.

Two interesting points present themselves for consideration in this case. The first is—What connection, if any, existed between the mobility of the kidney and the cystic condition present in it? Was the kidney cystic because it was movable, or was it movable because it was cystic? My own idea, which I advance with great diffidence, is that it was cystic because it was movable. One can readily imagine how a floating kidney would at times be so displaced that its outflow might become blocked by kinking of the ureter. Such blocking would naturally raise the water-tension within the kidney, and thus predispose to the development of cysts. Or, again, the interference with the circulation which must occur when the kidney moves through a large arc of a circle would tend to produce intermittent attacks of congestion, such congestion in turn producing some connective tissue overgrowth, the contraction of which would cause the cysts, as in ordinary cirrhosis. The microscopic section of this kidney, however, does not show anything like the amount of cirrhosis one would expect if the cysts were due to the cirrhosis.

On the other hand, it is quite conceivable that the mobility of the kidney was due to its cystic condition. The kidney being irregularly enlarged, the projections on its surface were so many points upon which the constantly moving abdominal viscera could act, and such a force, aided by the increased weight of the organ and tight lacing, may have caused the displacement. The point is of practical importance, though it may not seem so at first sight.

If the tendency of a floating kidney is to become cystic, then every kidney which has been floating for some time ought to be removed, and attempts at fixing the kidney, except in the very early stage, would be inadvisable.

On the other hand, if the kidney is already cystic and subsequently becomes movable, then it ought to be removed also, because the attempt to fix it does not remove the cause of its mobility—namely, its irregular enlargement and increased weight. Of course, these are merely points suggested for discussion, and I do not presume to dogmatise on the subject in any way.

The last case with which I will trouble you was the most interesting case of all, because in it the diagnosis was completely at fault.

CASE V.—In the month of March of last year I was asked to see a patient by my friend Dr. M'Cutcheon, and for the subsequent error in diagnosis I take complete responsibility.

His history was as follows:—Patient, aged fifty-nine, a working jeweller, of steady habits; some days before I saw him had been attacked with a violent pain diffused over the entire abdomen, but especially marked on the right side. With this was obstinate constipation and some distension, but no vomiting. On examination a swelling was easily felt and seen in the right iliac fossa, extending upwards and backwards along the crest of the ilium, vaguely fluctuating, and tender on pressure, dull on percussion, with œdema of the skin over it. The right thigh was flexed, and extension of it caused pain.

There was no history of any previous renal trouble; his urine was normal, acid in reaction, sp. gr. 1022, contained no albumen and no sugar. His temperature was 101°, tongue thickly coated, and skin slightly jaundiced.

I diagnosed the case as one of suppuration in the cæcal area, probably due to appendicitis, and determined to cut down upon it without delay. This was done on the day after his admission to the Richmond Hospital, and a large abscess opened. The abscess cavity having been washed out, I introduced my finger into the wound to explore it thoroughly, and was rewarded by the discovery of this small calculus.

The case was one of those which have been noticed frequently during the last few years in which a renal calculus gives rise to symptoms simulating those of appendicitis.

The subsequent history was uneventful, and the patient is now back at his usual business.

One other case I will briefly refer to, as it touches upon the all-important question of diagnosis.

CASE VI.—J. W., aged twenty-two, was sent to hospital, supposed to be suffering from renal calculus. He complained of shooting pains in left loin, tenderness on pressure, occasional attacks of vomiting, and frequency of micturition. Urine, acid; sp. gr., 1015; contained no pus, and a small quantity of albumen. On examination a distinct fulness was felt in the loin with an obscure sense of fluctuation.

An exploratory operation was carried out by the lumbar incision, and a large abscess opened. The kidney was found to be perfectly healthy, and no stone could be detected with either finger or exploring needle. On further examination, however, the abscess sac was traced up to the spine, probably to the first lumbar vertebra, which was evidently carious. In this case an ordinary spinal abscess had simulated renal disease.

Similar cases have been reported by Erichsen, by Wright, and by Jacobson, but I was unaware of them at the time, and was quite unprepared for the result.

I have made these records as brief as possible, so that I might have more time to discuss some of the general principles underlying the surgery of this region.

The first and most important is the question of diagnosis. What symptoms should lead a surgeon to diagnose the existence of a renal calculus? At first sight this seems an easy question to answer, as the statements in the text-books are very explicit. Pain in the loin, shooting down to the testicle, retraction of the testis, vomiting, frequency of micturition, blood and pus in the urine, and local tenderness or enlargement, are amongst the most important. When these

are present the probability is that a renal calculus exists, but they may exist without a renal calculus, and a calculus may be in the kidney without giving rise to them. Let me refer to cases of the latter group first.

In a paper read before the Surgical Section of the College of Physicians in Philadelphia, in October last, Professor J. William White, whose authority will not be questioned by any one familiar with his work, makes this statement:—

“Stone in the kidney, if smooth and embedded in the parenchyma, may give rise to no inconvenience whatever. The autopsy has, in a number of instances, given the first intimation of the existence of a renal calculus.”

To those who have not studied the subject this statement will be received with incredulity, but for all such sceptics I have at hand evidence that must convince them.

Through the great kindness of Dr. Henry C. Tweedy I am allowed to refer to a remarkable specimen. It was removed from the body of a man who died in Steevens' Hospital of general tuberculosis. During life it gave rise to no symptoms whatever, and nothing in his history before or after admission to hospital was ever elicited that would lead any one to believe such a serious state of affairs existed in his kidney. The kidney contained several large calculi, its lobules are little more than sacs of caseous *débris*, and evidently it represents a pathological condition which must have been the growth of years. Yet this patient never complained of pain in the lumbar region, nor of tenderness on pressure, though subjected to repeated examinations. Doubtless, during his stay in hospital any trouble his kidney may have caused was probably masked by the more urgent symptoms of general tuberculosis. Nevertheless, I think all will agree with me in saying that this case is in itself ample confirmation of Professor White's statement.

Probably the most reliable phenomena, clinically, are ten-

derness, pyuria, and local enlargement. Hæmaturia is so infrequent that it may be ignored.

Local enlargement or fulness in many cases is absolutely unrecognisable, and always unreliable even when present. Not only may it be caused by conditions outside the kidney, but it may depend upon pathological changes in the kidney other than stone. Twice I have felt what I believed to be a fluctuating swelling in the kidney area, but exploration in both cases showed the kidney to be normal. Tenderness on pressure is of great value when present, but unfortunately in many cases, as in one of those I have recorded to-night, it is completely absent, and its absence is no guarantee that a calculus does not exist.

Pus in acid urine is probably the most reliable symptom of all when it is present. Unfortunately it is not an early symptom, and even when present is not absolutely diagnostic, as it occasionally exists in renal tuberculosis.

It may be said, however, that if the stone is giving rise to no symptoms it is not doing any particular harm, and may well be left alone. When it does give rise to symptoms it can then be attacked by a surgeon. This is a plausible argument, but radically unsound. No one believes that a kidney is physiologically benefited by the presence of a calculus. The longer it is present the more complete will be the disorganisation and the greater the risk of operation subsequently, as shown by statistics. Moreover, a kidney may contain a stone, and yet give no indication of its presence until some slight injury to the organ sets the fire alight, as in the only fatal case that occurred in my practice which I have just detailed to you. For these reasons I think it is of the first importance that an early diagnosis should be made and an operation performed, even though the symptoms are not particularly urgent—in other words, that the operation should be performed before the kidney is wrecked.

The importance of early diagnosis being thus established, one naturally turns to skiagraphy for help.

The question I now propose to touch with a very halting and timorous hand is the possibility of our getting any assistance from the X-ray photography.

At the present moment I have in hospital a patient whom I suspect to suffer from renal calculus. His only symptoms are—frequency of micturition, intermittent appearance of pus in acid urine, and slight pain in the right loin, only present during muscular effort.

Professor McWeeney very kindly made a minute investigation of the urinary deposit for me, and his report is as follows :—

“Urine sharply acid, contains no tubercle bacilli, shows large quantities of oxalate of lime crystals and amorphous urates, mucus in great abundance, few pus cells, epithelial cells from the pelvis of the ureter, and bacteria of two kinds—the *Bacillus ureæ* and the *Staphylococcus pyogenes albus*.”

Now here was a typical case for the X-ray to clear up. Accordingly with the help of my friend, Dr. R. Lane Joynt, whose work in this direction is too well known to require any eulogy from me, I on two occasions submitted him to over thirty-minute exposures, but unfortunately with a negative result.

This man is very muscular and athletic, and therefore an unfavourable subject for skiagraphy, so that this failure did not really determine anything, though it did naturally enough engender some degree of doubt as to the possibility of photographing a stone in the kidney. I resolved, therefore, to carry out some experiments on the subject, which I did as follows, Dr. Joynt again assisting me :—

The first experiment was to determine the opacity to the X-rays of various calculi, relatively to each other, and also relatively to some well-known material which might be taken

as a standard. The object we chose as the standard was the human hand.

On a plate, therefore, I placed seven calculi—one, the largest, being an intestinal concretion which I removed by laparotomy from the small intestine of a lady suffering from acute obstruction; another a vesical calculus removed from a man aged seventy-two; and the others renal calculi of various sizes and shapes. Dr. Joynt's hand was then laid on the plate, and a five-minute exposure given.

The result is an excellent one. The numbers at the sides are cut from a sheet of tin, and the uniformity of colour they present is proof of the uniformity of the X-ray action over the entire plate. The photograph showed that the large intestinal concretion is barely opaque, that the large oxalate of lime is most opaque of all; it also shows most beautifully the concentric lamination of the urate calculus. It also shows that a calculus is practically as opaque as bone, as, *à priori*, one would have anticipated from its composition.

The next experiment was to determine if a calculus of known opacity could be photographed in the kidney of a thin subject. Through the kindness of Professor Fraser I obtained a thin female subject, and made the following experiment:—

An incision being made in the middle line the kidney was lifted out, the ureter and kidney cut into, and the most opaque calculus in my collection put into the kidney sinus. The wound was then sutured, the kidney replaced as accurately as possible, and the abdominal wound closed. It will be noted that the stone was placed as far forwards as possible, so that the rays would have to penetrate the largest possible amount of kidney substance, in addition to the overlying liver. Before closing the abdominal wound I thrust a needle from the side through the parietes and into the kidney substance until it touched the stone. Thirty-five minutes' exposure was given.

The stone is easily seen, so is the needle, and the photograph clearly demonstrated that a large calculus in a thin patient can be found by the X-rays. The right kidney was selected for the experiment, as owing to the way in which it is enveloped by the liver it would probably afford the greatest difficulty to the photographer.

I regret that the photographs of the actual patient were not as successful; this of course may be due to the fact that he has not a calculus, but it may also be due on the one hand to his great muscularity, and on the other to a too brief exposure. Mindful, however, of the effects produced in Dr. Drury's case, we did not feel justified in submitting him to more than thirty minutes' exposure on each occasion.

One other aid to diagnosis remains to be mentioned before I leave this part of my subject—namely, needling the kidney from without.

This is a method that is apparently very commonly practised in America, but is not popular here. In these islands there exists amongst surgeons a rooted objection to what may be called "groping in the dark." I have a great deal of sympathy with this feeling, but it is quite possible for us to be carried too far and to dismiss the suggestion of needling without sufficient consideration. Men talk rather glibly of the perfect safety of an exploratory operation even on the kidney, but in my humble opinion exploring a kidney is a very serious undertaking, not to be attempted without the weightiest justification, and if needling can be done safely I would not hesitate to employ it, though I have not yet done so. Before deciding to recommend it, it behoves us first to study the anatomy of the region very carefully, and to weigh the possibilities and dangers of the procedure.

Through the kindness of Professor D. J. Cunningham I am enabled to submit some diagrams and preparations that have for me an interest amounting to fascination, and which

I trust will not be devoid of interest to you. Three diagrams show the position of the kidney as seen in transverse sections through the frozen cadaver at different levels. The fourth is taken from a subject in which the organs were hardened *in situ*, and the kidney and its relations are shown from behind. By a fortunate coincidence Professor Cunningham has been for some time past devoting his attention to this

Fig. 1.

Section through abdomen at the level of the second lumbar vertebra.—
(From Cunningham.) 1, Cauda equina; 2, vena cava; 3, aorta;
4, pancreatic duct; 5, pancreas; 6, common bile duct; 7, duodenum;
8, colon; 9, renal vein; 10, liver; 11, right kidney.

particular branch of anatomy, and he has very kindly and generously placed his minute knowledge of the subject at my disposal for the purpose of this paper. A study of these diagrams is calculated to make one hesitate before plunging a needle into the kidney from without. Be it noted that very few calculi are found in the cortex of the kidney; the large majority are in the renal sinus either in the pelvis of the ureter or in one of its calices. This being so, look at the proximity of the large blood vessels to the seat of the calculus. Note what a very small interval separates the cava from

the front of the right kidney, and what a still narrower interval separates the pelvis of the ureter from the renal vessels.

Fig. 2.

Section through the abdominal cavity of a young subject at the upper border of the twelfth dorsal vertebra, above the level of the foramen of Winslow. From this it will be seen that the lobus Spigelii is the only part of the posterior surface of the liver which is clothed by the liver sac. 1, Liver; 2, stomach; 3, spleen; 4, kidney; 5, suprarenal capsule; 6, diaphragm; 7, aorta; 8, vena cava; 9, lesser bag of peritoneum.—From Luschka's "Anatomy."

Again, this photograph of the dissection from behind shows us two very important points.

The first and most obvious is, what a very small amount of the kidney can be seen in the ilio-costal space. The less striking but even more important point is the fact that the pleura dips down as low as the external arched ligament, and the tip of the first lumbar transverse process. The wooden models made by the "reconstruction method" are very instruc-

tive. They show that under normal circumstances the right kidney cannot be recognised by palpation at all through the abdominal wall, as the overhanging edge of the liver completely enfolds it, so that only the tip of the kidney is on a plane lower than this edge.

Fig. 3.

Transverse section through abdomen at the level of the first lumbar vertebra.—(From Cunningham.) 1, Left kidney; 2, spleen; 3, crus of diaphragm; 4, suprarenal capsule; 5, colon; 6, splenic artery; 7, pancreas; 8, splenic vein joining the portal vein; 9, aorta giving off the superior mesenteric entry; 10, rod in bile duct; 11, inferior vena cava; 12, duodenum; 13, colon; 14, suprarenal capsule; 15, liver; 16, right kidney; 17, first lumbar vertebra.

The second model shows that when the transverse colon is distended with gas the overhanging edge of the liver is raised from the kidney. These preparations are calculated to raise grave doubts as to the reliability of the statements so frequently made in reports of cases, that “the right kidney was recognised to be slightly enlarged, &c.” If these models and diagrams are correct—and Professor Cunningham’s reputation removes all doubt on that point—it is obvious that right renal enlargement must be very considerable before it can be appreciated by palpation.

Again, they also show us that we are more likely to get a successful X-ray photograph if the tube is placed not directly over the kidney but to one side of the middle line,

Fig. 4.

From a photograph of a cast of a dissection to show the relations of the kidneys from behind. Organs previously hardened *in situ*. Shows kidneys from behind eleventh and twelfth ribs, arcuate ligaments, pleural reflections, quadratus muscles, and lumbar vertebræ. This preparation, made by Professor Cunningham, shows that the general ideas hitherto held as to the anatomical relations of the kidneys are quite erroneous.

and on a lower plane—to the left for the right kidney and *vice versa*—the plate being fixed obliquely behind so that the rays may fall vertically on it. By this manœuvre the mass

of the liver which offers so great an obstacle to the rays will in part be avoided.

Returning to the question of needling from an anatomical

Fig. 5.

Model of liver and right kidney seen from the front—only tip of kidney is seen between gall bladder and inferior extremity of right lobe of liver. This model was made from a preparation in which the organs were hardened *in situ*. The subject was a young adult who committed suicide by cutting his throat. The hollow viscera were absolutely empty, and anterior abdominal wall retracted, so that the liver is flattened from before backward.

Fig. 6.

Profile view of the same liver and kidney as in Fig. 5, seen from the right side.

point of view, these diagrams and models show us that the tip of the second lumbar transverse process may be regarded

as the anatomical guide to the operation. Above that point there is danger of wounding the pleura, inside that point the vessels of the kidney may be wounded. At a distance of from one-half to three-quarters of an inch outwards from the tip of process the needle will traverse the liver, and at a

Fig. 7.

Model of liver and right kidney from a child aged three, seen from the front. The transverse colon was greatly distended, and the anterior edge of the liver was therefore pushed upwards, so that its vertical diameter was much diminished.

Fig. 8.

Right profile view of Fig. 7. The tip of right kidney reaches a point slightly lower than lowest point of liver. The continuity of surface behind is well shown, as well as the impressions of ribs in liver surface.

slightly lower level the colon. On the left side the space is even narrower, as the kidney, except at its tip, is enveloped by the spleen.

We see, therefore, that the space from which we commence our exploration is very confined. Not only is it confined, but in actual practice it will be difficult to determine. It is impossible, owing to the mass of muscle that covers it, to feel

the tip of the transverse process, the anatomical landmark from which the exploration starts. It can only be approximately located. Let us assume, however, that by careful measurement and palpation we have determined its position, let us next see what we have to avoid. Remember that below the level of the liver and spleen the hollow viscera fill up the interval between the kidney and outer wall; should the needle traverse them, apart from other dangers, it will practically amount to an inoculation of the kidney with the *Bacillus coli communis* and other enterprising organisms.

Assuming that we avoid these dangers, we must now decide to what depth we can safely go. To determine this point accurately an elaborate series of calculations must be first made to determine the ratio between the whole thickness of the body at this level and the distance from the periphery of the renal sinus to the outer surface of the back. Until this is done the exploration will be pure chance and nothing more. The variations in healthy persons are so great that reliable data can hardly be obtained.

Further, at such a depth and in such solid tissues lateral movement of the needle is impossible, so that anything like thorough exploration will necessitate very many separate punctures. I am not in a position to discuss the actual danger of hæmorrhage from these punctures, never having had any personal experience of the method in this connection, but one of the most distinguished physicians in Dublin tells me that he once saw death follow an exploratory puncture of the spleen, the bleeding being uncontrollable. An experience of this kind is calculated to make us hesitate before facing the risk of a similar calamity.

Again, it must not be forgotten that experiments have shown that puncture of one of the arterial arches of the kidney, followed by thrombosis of the vessel, has induced necrosis of portion of the kidney.

Nevertheless needling an exposed kidney has been hitherto looked upon as a harmless proceeding, and it is difficult to conceive why it should be more dangerous in one case than in the other.

The objections to needling may be briefly summarised thus:—

1. The limited space available for preliminary entry of the needle into kidney.

2. The danger of wounding the hollow viscera and inoculating the kidney from them.

3. The danger of wounding the renal vessels or even the cava.

4. The necessity for many punctures to insure thorough exploration.

5. The difficulty of determining to what depth the needle can safely be thrust.

6. The danger of local necrosis of kidney.

Though I have dwelt thus markedly on the dangers of needling the kidney, I can easily conceive it possible that these dangers would be justifiably faced when the much graver operation of exposing the kidney in the loin could not conscientiously be recommended. I await with interest the opinion of the Section on the subject, and confess that should the general trend of opinion be in its favour I should be inclined to give it a trial in an appropriate case. Having said so much on the question of diagnosis, let me now say a word on the method of operating, either when a stone is to be removed or when the whole kidney has to be extirpated.

Let us take the cases of nephro-lithotomy first. In my previous communication, read some six years ago before this Section, I discussed at considerable length the advisability of making a median abdominal section in addition to the usual lumbar incision, the method so strongly advocated by Mr. Knowsley Thornton. I will not recapitulate the

arguments then advanced, which are published in the Transactions of the Academy, and are accessible to anyone interested in the subject, but I have no hesitation in saying that after the additional experience of the past six years in my own practice and that of my colleagues, I feel more strongly than ever that such an addition to the usual procedure is both dangerous and unnecessary.

As to the question of the best site for the incision in nephrectomy, on this point also my opinions have become crystallised into convictions. Three methods claim consideration:—

1. The intra-peritoneal, either through the median line or the linea semilunaris.

2. The extra-peritoneal method, the incision being made through the linea semilunaris, and the peritoneum being raised off the abdominal wall and kidney, after the manner practised in Abernethy's operation for tying the iliac arteries.

3. The lumbar method, with transverse or oblique incision, capable of enlargement in any direction at its anterior extremity.

Let me now review some of the more salient features of these methods. I think we may at once dismiss as unworthy of consideration the incision through the semilunar line, followed by detachment of the peritoneum over a large area. The objections to it are so obvious that it is not necessary to detail them.

The choice, therefore, lies between the intra-abdominal route, the lumbar incision, and the conjoint method. Personally I favour the lumbar incision primarily, followed if necessary by a vertical incision at its anterior extremity, and I do so for the following reasons:—

1. It undoubtedly offers the easiest and shortest route to the kidney.

2. Through it the pedicle can easily be secured before any attempt is made to detach the kidney from its bed.

3. Through it the kidney can be more easily and safely separated from adherent neighbouring organs.

4. If the kidney is the seat of a large abscess, such abscess can be readily and safely drained without danger of peritoneal infection, before any attempt is made to deliver the kidney through the wound.

5. In case a calculus should be impacted in the ureter, unless it be below the pelvic brim, it can be more easily dislodged from the loin than from an abdominal opening.

6. The danger of infection from the exposed end of the ureter is avoided by the lumbar incision.

Against the loin method only one really valid objection can be urged—namely, that a very large kidney cannot be delivered through it. That this may occasionally be true I quite believe, but such cases are rare, and if the enlargement is due to the presence of fluid in a sac, previous tapping of such sac through the loin wound will, in the majority of cases, sufficiently reduce the bulk of the mass to permit of its removal without great difficulty.

Against the anterior route may be urged:—

1. The added danger of peritoneal infection.

2. The difficulty of manipulating the pedicle through a narrow aperture liable every moment to be blocked by rebellious coils of intestine.

3. The great difficulty that exists in detaching the kidney, if adherent, at such depth from the surface.

4. The great liability of tearing the thin-walled renal vein in the necessary manipulations.

5. The possibility of wounding the vena cava, as occurred in Mr. Thornton's case.

I have no doubt that my views will be vigorously traversed. The anterior method at present is very popular—so much so

indeed that an appalling new name has been advised for it. This popularity, I think, may be due to the fact that all abdominal operations of recent years have become much more successful than they used to be, and, illogical though the reasoning may be, it appears as if men hoped to graft the success of laparotomy in general on to the operation of nephrectomy in particular, and thereby diminish some of the dangers attending what must be acknowledged to be a very grave operation.

[The illustrations in this paper are reproduced from the *Edinburgh Medical Journal* for September, 1897.]

The PRESIDENT said he was sure that everyone present considered Mr. Myles' paper both interesting and important. With regard to the question of needling as an aid to diagnosis, he did not believe in sticking a needle into the loin in the hope of finding the kidney or of hitting a stone.

PROFESSOR BENNETT considered the question of diagnosis of renal calculus of prime importance. It was possible for a calculus to be present without giving rise to any symptoms. He had himself, a few years ago, recorded a case of a man who had died from ascites, and *post-mortem* examination disclosed a calculus in the kidney. He could attest that the patient had never had any symptoms whatsoever of renal calculus.

MR. BALL said that in experimenting with the X-rays one ought to be cautious in drawing conclusions as to the presence of a stone. From the photographs which Mr. Myles exhibited, it could be seen that some calculi gave photographs like those given by gall stones, which are very transparent. The skiagraph was of no use, he said, in cases of cholesterine calculi. Calculi containing a large quantity of lime or phosphate gave a good skiagraph; but lithic acid was almost as transparent as cholesterine. With reference to palpation as an aid to diagnosis, he considered that it could not be very much relied on. He mentioned a case in which there was a good deal of pus in the urine, but with no definite symptoms of stone. It was discovered that pus was coming from one ureter, and subsequently a considerable

tumour was found on palpating the lumbar region. An incision was made, but efforts to detect a stone were fruitless. The man improved in health, though suppuration continued. Subsequently the kidney was removed, and a stone of considerable size was discovered. Recovery was complete. He referred to another case in which it was thought that gonorrhœal inflammation had spread up the ureter to the kidney. The case became serious, and, on cutting down, the kidney was found to be of considerable size. He drained off a large quantity of pus, and his finger struck a large stone. Such cases, he said, showed the extreme difficulty of diagnosis of renal calculi.

MR. TOBIN thought that no definite rule could be drawn about the position of incision. He considered the anterior incision better if there was no pus in the urine and no rise of temperature. He had seen some very large tubercular kidneys removed through an anterior opening—so large, indeed, were the kidneys that some matter from them could not have failed to get into the peritoneal cavity.

SIR WILLIAM STOKES said that he had adopted the line of incision to which Mr. Myles objected. He had seen cases in which he thought that he (Mr. Myles) would have adopted the anterior incision also on account of the large size of the tumours. He considered Mr. Myles needlessly apprehensive of peritoneal troubles from the anterior opening. A more satisfactory view, he thought, could be obtained from the anterior opening. He considered the X-rays an important aid to the diagnosis of renal calculus, and they would probably be of much greater aid when brought to perfection. He agreed with the President in his remarks about exploration with the needle.

MR. M'ARDLE thought the X-rays of great value in the diagnosis of calculi. He had experimented with tubes somewhat different from the usual kind, and had found that cholesterine crystals were shown very clearly, so that the question of translucency was of no weight at all. With regard to needling, he had himself practised it as well as passing sutures through the kidney in his first operations on floating kidney, but he had now abandoned the practice as the results had been unfavourable. The question of the floating and cystic conditions of the kidney being present together was a very interesting one. He had formerly shown a cystic kidney with the ureter shaped like the figure S, and could not be uncoiled. There had been an intermittent discharge of pus for two years. This case bore out the statement that displacement

of the kidney produces such changes as to bring about a cystic condition.

MR. R. LANE JOYNT said that from skiagraphy negative results were sometimes obtained. With reference to the case at present in hospital to which Mr. Myles had referred, the shadows on the first plate, though definite, could not be recognised as any known objects. A second photograph showed the ilium, but not the spine, and was therefore rejected. A third photograph revealed the spinal column distinctly, but no calculus was evident. He therefore concluded that, at all events, an opaque calculus was not present, but that a translucent calculus might be present.

MR. MYLES, in reply.—The case which Professor Bennett had mentioned was further proof that a calculus could be present without creating symptoms. He (Mr. Myles) thought it would be interesting to collect kidneys with calculi in them, and find out the amount of damage done to the kidney in each case. He quite endorsed Mr. Ball's remarks about abdominal palpation, and he had often seen surgeons deceived by this procedure. He hoped that Sir William Stokes did not think that he (Mr. Myles) objected to a vertical incision in addition to the original one; but, hitherto, he had commenced the incision from behind, and believed that there was an advantage in so doing, as in that way he could begin with the retro-peritoneal operation. Mr. M'Ardle had pointed out an advantage in controlling hæmorrhage obtained from the anterior incision. Mr. Myles considered that an open question, as the placing the clamp on the renal vessels had sometimes been attended with great danger.