This was not always secured by the early plans of suturing the adipose tissue, the fibrous capsule, or the kidney parenchyma to the lumbar muscle or aponeurosis. Many needlessly complicated plans have been advised. Tuffier's, Lane's, and others seem to me to come under this category.

A simple and satisfactory plan is to separate the kidney from its fatty capsule by free dissection with the finger, to irritate the fibrous capsule by scratching with a scalpel, to fix the lower part of the kidney by two sutures of catgut, silk, kangaroo tendon, or silkworm gut to the lumbar muscles and aponeurosis, and, most important of all, to insert alongside the kidney large drainage tubes or packs of gauze, which are left in for a week to produce aseptic inflammation and granulation. Alternatively, instead of sutures, bridges of gauze may be passed over the upper and lower poles of the kidney, and tied over gauze packing running alongside the kidney, the wound healing up by granulation. Excellent results have followed the first method in my hands, but I prefer the second, which I believe was first suggested by Senn. It certainly obviates the alleged risks of suture—namely, urinary infiltration, abscess of the kidney, and cirrhosis of the kidney.

The following ten cases of movable kidney have come under my care during the last three years:

CASE I.—*Right Movable Kidney: Marked Gastric Symptoms: Nephropexy: Cure.*

Mrs. C., aged 50, multipara, was seen some two years ago. Her history was that for four years she had suffered from dragging pain in the side, and that recently she had been much troubled with vomiting. She was wasting rapidly, and had most of the symptoms of pyloric obstruction. She looked cachectic, and I at first suspected malignant disease. Examination showed a very movable kidney, which could be pushed down to the brim of the pelvis, had the characteristic tenderness of the kidney, and on reposition could be palpated bimanually. Operation was advised, and she came into the Northern Nursing Home for that purpose. The day's rest there improved her so much that she asked for a respite from operation. The symptoms returned immediately she began to get about, and she came back for nephropexy, which was absolutely successful in removing all the symptoms. I saw her recently, when she stated that she had been in perfect health ever since operation.

CASE II.—*Right Movable Kidney: Marked Gastric Symptoms: Nephropexy: Cure.*

Mrs. C., aged about 60, was transferred to my ward in the infirmary by Dr. Lister. She had been sent to the infirmary for symptoms which pointed to malignant disease of the stomach. Dr. Lister discovered a movable kidney, and rest in bed removed the more troublesome symptoms, and prepared her for operation, which was done about eight months ago. The kidney, as in the first case, was found to be movable as far as the brim of the pelvis. When the patient left hospital all her symptoms had disappeared. I examined her the other day, and found the kidney immovable. She is still neurasthenic.

CASE III.—*Right Movable Kidney: Severe Haematuria: Disease of Kidney: Nephrectomy: Cure.*

A lady was seen in the country with her medical attendant, who had been treating her for haematuria, which was considerable in amount. He had explored the bladder for villous tumour, but found nothing, and as the haematuria persisted even with rest in bed and haemostatics, he asked me to see her. We found a right movable kidney of about normal size, slightly tender on pressure. The pain which the patient complained of was on the left side, but it is well known that in movable kidney the pain may be referred to the opposite side, as Landau pointed out many years ago; for instance, right movable kidney is sometimes associated with a left pleurodynia. It was decided to fix the kidney if found healthy, and to remove it if there was evidence of disease. A nephrotomy was done, and as the upper part of the kidney was found to be much congested, and on section had the appearance of malignant disease, it was thought desirable to remove it. The patient made a perfect recovery.

CASE IV.—*Right Movable Kidney: Extreme Hydronephrosis: Nephrectomy: Cure.*

A young woman, aged 30, was sent by Dr. Geddie for movable kidney and hydronephrosis. The hydronephrosis was not markedly "intermittent," and on nephrotomy being done it was found that renal tissue was practically absent, there being the merest thin shell of it on the outside of what felt like a large cyst. It was decided to perform nephrectomy. The mobility was not, in my opinion, due to the increased weight of the kidney, but was, I think, the cause of the hydronephrosis. There were no tube casts, nor was there albuminuria in this case, as is sometimes found in the intermittent hydronephrosis of ectopic kidney.

CASE V.—*Movable Right Kidney: Neuralgia and Pleurodynia: Palliative Treatment.*

Miss M., aged about 45, consulted me about pain in the right side, which had been troubling her for some years, and had been ascribed to ovaritis or appendicitis. The right kidney was found to be very movable, and pressure on it caused the pain complained of during exertion. A supporting bandage was tried, but was of little service. The symptoms were not sufficiently aggravated to justify operation. The pleurodynia and pains over the right shoulder I can attribute only to the renal condition, and may be on a line with the pain felt there in hepatic disturbance.

CASE VI.—*Right Movable Kidney: Increased Frequency of Micturition: Pyelitis.*

Mrs. W., aged 60, has for years suffered from pain on the right side,

referred to the kidney region. She had some years ago haematuria, and consulted an Edinburgh surgeon, who was suspicious of renal calculus. With rest and care the condition much improved and the haematuria ceased. I found on examining her a mobile kidney, larger than usual and tender on deep pressure. Slight frequency of micturition is now complained of, there is no haematuria, and there is very little pus in the urine. With care her condition is tolerable, but any undue exertion causes dragging pain. It is possible that she may have a small renal calculus as well, though there is no evidence of it on skiagraphy, which Dr. Galloway carried through for me. Pyelitis does occur as a complication of movable kidney apart from renal calculus, and I am inclined to attribute it to that in her case. It is a case for operation, which is postponed for the present for family reasons.

CASE VII.—*Left Movable Kidney after Uretero-ureterostomy for Fibroma involving Ureter: Fibroma attached to Renal Vein found at Operation: Nephrectomy: Recovery.*

J. D., aged about 50, was operated on four years ago for retroperitoneal fibroma, which involved the left ureter. I had the privilege of assisting Professor Ogston at the operation. He found it necessary to remove over an inch of the ureter, the continuity of which was secured by uretero-ureterostomy, with a most satisfactory result. The case was an early and brilliant example of this operation. About a year ago she consulted me about pain on the left side, but as she was morbidly neurasthenic, and nothing objective could be made out, operation was disadvised. Recently she came back to my ward. She complained of agonising pain on the left side, for which she required opium. After several examinations I made out a distinctly movable kidney on the left side, movement being attended with great pain. A recurrence of the growth in the peritoneal scar or in the ureter was also thought of, and occasionally a hardish tumour could be felt in front of the kidney. The kidney was cut down on, and its pelvis was seen to be much dilated, and attached to it, and still more firmly to the renal vein, was found a fibroma. In attempting to separate the tumour from the vein the latter was wounded. As the patient's condition was not at all satisfactory under the anaesthetic, nephrectomy had to be performed as rapidly as possible. The old uretero-ureterostomy scar was palpated, and, as far as could be found out, there was no recurrence of the growth there. The patient made a good recovery, and the pain on the left side entirely disappeared. I am informed by Dr. Gordon that she died nearly a year after nephrectomy was performed from malignant disease of the pancreas.

CASE VIII.—*Right Movable Kidney: Nephropexy: Cure.*

Mrs. H., aged 56, had renal pain and tenderness for some years. Latterly the pain had become aggravated, attended with frequency of micturition. Some days very little urine was passed. A right movable kidney could be easily made out. A daily examination of the quantity of urine passed showed an "intermittent hydronephrosis." The operation performed was very simple, the kidney being exposed, separated from its fatty capsule, and supported in the wound by bridges of gauze, while gauze packing was inserted on both sides of the organ. The first dressing was done in about a week's time, and at intervals thereafter. The result was an uneventful recovery and a perfect cure.

CASE IX.—*Right Movable Kidney: Nephropexy: Cure.*

Mrs. W., aged 27, complained of similar pain, with occasional hydronephrosis, and was operated on in the same way with a perfect result, the right kidney becoming fixed to the loin by strong fibrous adhesions.

CASE X.—*Right Movable Kidney: Gastric Symptoms: Nephropexy: Cure.*

Mrs. D., aged 25, was sent to me by Dr. Cowie, Turfiff, with a diagnosis of right movable kidney. The excursion of the kidney was very considerable, and had caused great pain, attended with vomiting and general abdominal disturbance. A support had been worn for some time, but was found to be worse than useless. She was operated on in the same way as the last two cases, and with an equally good result.

An Address

ON METHODS OF INCISING, SEARCHING, AND SUTURING THE KIDNEY.

Delivered before the New York State Medical Society.

By HOWARD A. KELLY,

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My studies for some years past, in operating upon numerous patients who have come to me with renal disease, have demonstrated the extreme importance of a more thorough knowledge of the anatomy of the kidney itself; and, having arrived at some definite conclusions upon this head, I take pleasure in presenting certain facts before you for the first time in a public address. I shall confine my attention to-day to the methods of incising, searching, and suturing the kidney where calculus is believed to be present.

The diagnosis of stone in the kidney has fortunately been so greatly simplified by the use of the *x* rays that with this agent we can now determine the presence or absence of stone in all cases with practical certainty. I recently delivered an address upon this subject before the American Gynecological Society

Fig. 1.—A shows a kidney viewed from the lateral border. The pelvis is in its normal state of collapse, as is shown also in the cross-section drawn above. The pelvis and infundibula are seen as a comparatively narrow slit in the centre of the organ. It is easy to see how difficult it is at times to direct the incision properly and not nip off the papillae of the posterior pyramids. B shows the same kidney with its pelvis in state of distension. The lobules are much more clearly visible, and the palpating hand feels with ease the various pockets of the pelvis as they fill themselves with the fluid, the diagram above demonstrating the other merits of this distension. It produces: (1) A theoretical reduction of the thickness of the parenchyma; (2) a separation of the two vascular systems of the kidney, facilitating considerably (3) the finding of the least vascular plane of the kidney; (4) a temporary reduction of the amount of blood in the kidney; as all the large veins are in immediate contact with the pelvis, it is readily seen that a distension of the pelvis must force the greater part of the venous blood out of the kidney; (5) a safeguard against cutting off the papillae of the posterior pyramids, enabling the surgeon to make his incision with the least amount of injury to the secreting structures.

Fig. 2.—The renal artery and the distribution of its branches in relation to the pelvis. The upper diagram represents a transverse section through the middle of a left kidney. The anterior branches of the artery supply about three-quarters of the kidney substance, while the posterior branch supplies only a quarter. The dotted line and arrow *a* indicate the plane of arterial division; *b* shows a depression on the surface of the kidney which marks the border line between the cortical portions of the anterior and posterior row of pyramids; *c* is a section of the longitudinal column of cortical substance in which the great majority of the renal vessels pass. The lower figure is drawn from a corrosion specimen. The vessels of the cortex have been omitted for the sake of clearness.

Fig. 4.—Section and lateral view of a kidney indicating the method of determining upon the most advantageous incision through the parenchyma. This method is safe in all cases where the majority of blood vessels can be palpated as passing anteriorly to the pelvis and where the longitudinal white line is in its usual position.

Fig. 6. Instrument for Exploring the Kidney.

Cross-sect.
of needle.

Fig. 5.—Method of approximating the two cut surfaces. A glance at Fig. 2 shows why simple interrupted sutures almost always tear, because they are placed in the same plane with the large vessels, which form the strongest framework the kidney possesses. Fig. 2 also shows why mattress sutures are best adapted for uniting the two cut surfaces—because they pass at right angles or nearly so to the large vessels, preventing effectively any tearing of kidney substance. They are passed through the parenchyma near the pelvis because most of the venous oozing is to be expected from that region; *a*, catgut sutures approximating pelvis (can be dispensed with); *b*, deep catgut mattress sutures passing as much as possible

through cortical substance, avoiding the pyramids. They are best placed with a long straight three-cornered needle with blunt point in order to avoid injury to large vessels. The needle should not be thrust or forced through the kidney but its blunt point should be allowed to feel its way through the parenchyma, avoiding all structures that offer greater resistance than the safe cortical substance; *c*, is a second system of mattress sutures which may be dispensed with, if the first row of deep sutures produces the desired effect; *d*, is the usual suture of the capsule.

in Chicago, in which I brought together a series of cases in which I had determined the presence of stone in the kidney by passing a bougie up the ureter into the renal pelvis, having its tip coated with a highly polished but impressible wax surface. This interesting means of diagnosing the presence of a stone is, however, far less certain than the *x* rays, and has therefore been very happily superseded by it; the wax tip remains, however, of value in cases of ureteral calculi where it may give certain knowledge both of the presence and of the exact position of the calculus.

I will now briefly discuss several practical points relating to the technique of the operation upon the kidney.

THE URETERAL CATHETER.

I find the ureteral catheter of value in many operations for renal calculi in two ways: In the first place, before the operation the catheter is passed up the ureter into the pelvis of the kidney, which is then thoroughly irrigated and washed out by letting water flow into it from a funnel, in this way distending the pelvis; the water then escapes down the ureter into the bladder, and out into a receptacle through a catheter introduced through the urethra; boracic acid or a weak carbolic acid solution may be run through the kidney in this way, washing away the pus, and rendering the surfaces relatively clean. The second use of the catheter is after washing out the pelvis to leave it *in situ*, and then to expose the kidney by the lumbar incision; before incising the kidney, however, fluid is forced rapidly into the renal pelvis, so as to distend the pelvis and cause the kidney to swell up, making prominent certain surface landmarks which serve as a guide for a correct incision into the organ. If the kidney is grasped in the full hand during the distension the exact position of the calices can be detected, as it alternately swells and collapses as the fluid is forced in. If one part is sacculated, or if the cortex is thinner at one point, this is also at once evident, and the incision is best made there. In normal kidneys this distension is almost imperceptible on the convex surface, but where calculi are present the antero-posterior diameter is sometimes increased 1.5 cm.

The lobules of the kidney are made prominent and the fibrous vascular septa between them are readily distinguished when the kidney is distended (Fig. 1, *A* and *B*). If the kidney is cut into in this distended state, there is less injury to the cortex, and the operator is at once made aware of the opening into the pelvis by the sudden gush of water. A small stone is sometimes washed out in this way, saving a painstaking search and further cutting. The irrigation of the pelvis of the kidney out through the incision by means of the renal catheter can be kept up as long as the catheter is left in and the wound remains open.

The use of the catheter to distend the kidney was first suggested to me by Mr. Broedel, to whose anatomical studies I am constantly indebted in this paper.

SITE OF INCISION.

The question of maximum importance in the surgical treatment of renal calculi is the best position for the incision through the substance of the kidney into the calices and the pelvis. Operators often speak of making a *post-mortem* incision down the dorsum in order to lay it freely open, and so as to expose the renal pelvis. Mr. Broedel's researches have developed the important fact that the vascularization of most kidneys is provided by two arterial systems which are completely separated by the renal pelvis. There is a major system carrying three-fourths of the arterial blood providing for the anterior, and a part of the posterior half of the kidney, and a minor system carrying one-fourth of the arterial blood providing for the remaining posterior portion (Fig. 2). The nearer the surgeon makes his incision in the line which divides these completely separated systems, the less blood is lost. If, however, he strikes the major vessels of either of these systems the haemorrhage may be frightful, even great enough to cost the patient's life.

The more a pelvis and the calices are distended the further are the two vascular systems separated. While in cases with normal undistended pelvis there is rarely more space than a few millimetres between the anterior and posterior vascular plane, quite the opposite occurs in distended pelvis when the two vascular systems are not infrequently parted by as much as 2 cm. or even more.

Certain easily recognisable anatomical landmarks on the surface of the kidney afford a guide to this important relatively non-vascular zone sufficiently reliable for practical purposes. If the kidney is examined attentively it will always be found divided up into irregular areas (the bases of the pyramids) the size of the end of the thumb; these areas are bounded by lighter coloured lines which are often slightly depressed. These whitish lines represent the columns of Bertini, which extend up between the pyramids forming the framework which supports and carries the vessels. The white lines come together in a longitudinal white line on the anterior surface, which I propose to call Broedel's white line (Fig. 3, b-b').

When the white lines which divide the pyramids cannot be found easily, their position is often marked by little groups of stellate vessels.

The best place, then, to incise the kidney is down through the lateral portion of the posterior pyramids between the anterior and posterior vascular trees. The worst possible incision is the one which follows the course of or wounds largely the vascular column found in the cortical septa between the pyramids. In order, then, to make the incision correctly, one must cut parallel to Broedel's line and parallel to the posterior surface of the kidney, leaving about three-fifths of the kidney anterior and two-fifths posterior to the incision (Fig. 4, A). The cut must be extended in a parallel direction to the posterior surface and not angling towards the centre of the kidney, as one would naturally incline to do (Fig. 4, B).

Through such an incision, laying open the calices, both anterior and posterior systems of calices can be readily explored.

These rules hold good when the topographical anatomy of the kidney is normal or nearly normal. About two-thirds of all kidneys are constructed on these lines, and in all such cases the landmarks just given will prove a reliable guide.

Owing to irregularities of fetal development the circulation of the kidney may assume a more or less abnormal character. The effect of such abnormal arrangement upon the circulation along the lateral border may be such that the least vascular plane is shifted forward, so that it comes to lie in the plane of median section or may extend even into the anterior portion of the kidney. Conditions of this kind are as a rule recognised in two ways.

1. By the form of the kidney, which shows Broedel's longitudinal white line not on the anterior surface but further back, as well as by the bulging of the posterior surface of the kidney (which is much flattened in normal cases).

2. By the arrangement of the large arterial trunks at the hilum. If the palpating finger feels as many vessels entering the parenchyma anteriorly to the pelvis as posteriorly, this would be an indication for an incision through the middle of the lateral convex border. If there are even more vessels posteriorly to the pelvis than anteriorly (extremely rare), the least vascular plane would be found in the anterior third of the kidney.

To reiterate. The incision should pass parallel to the longitudinal white line, 1 cm. away from it and on the same side of the kidney where the palpating finger feels the lesser number of vessels, in the majority of cases on the posterior surface, but occasionally anteriorly.

Where the renal pelvis is not divided, after extracting the stone, I then explore the remaining calices with a little delicate steel curved handle attached to a blunt knife (Fig. 6), which at once reveals the presence of even a small stone by the grating sensation conveyed. When a stone is found the blunt curved handle may be pushed up into the calyx and the incision made down through the prominent part of the corresponding pyramid, and the stone extracted in this way through a small additional incision, in case it cannot be lifted out with forceps through the original incision. In place of one long incision laying open the entire pelvis of the kidney, Dr. Finney has recommended, and I have resorted

to, two incisions into upper and lower poles separately, so as to spare the median portion of the kidney. Such a procedure of course is applicable only if we have to deal with a double pelvis, or if we are sure that an undivided pelvis is of simple formation and capacious; it is contraindicated where there is a pelvis of complex form with many pockets.

It is best, as a rule, not to try to remove a stone directly through the pelvis of the kidney without incising the renal tissue proper. I would resort to this plan only where the stone is known to be a small one, and there is no inflammation or oedema of the pelvis, and where the pelvis can be exposed, incised, and sutured without much difficulty.

SUTURING THE KIDNEY.

Where it is advisable to close the wound into the kidney we receive from Mr. Broedel's studies some valuable hints as to the best methods of suturing the kidney so as to close the pelvis and bring its surfaces into accurate apposition and prevent the further bleeding. (Fig. 5.) Three sets of sutures may be used to advantage, one of fine catgut placed between the calices including the fat and fibrous tissues without involving the mucous surfaces. By this means the pelvis is approximated.

The second series of sutures, the most valuable, as devised by Dr. Hunner and Mr. Broedel, are one or two series of mattress sutures introduced with a straight, slightly-blunted needle, extending through the entire substance of the kidney. These give a perfect and sufficient control over bleeding. Finally, for perfect accuracy the capsule may be closed by a continuous catgut suture.

CLINICAL OBSERVATIONS IN THE TREATMENT OF SEVERE "STAMMERING" BLADDER AND URETHRA.*

By E. HURRY FENWICK, F.R.C.S.,
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ALL are familiar with the clinical picture of the young male patient who cannot urinate if any one is looking at him, but who has to retire, or even enter a watercloset before he can empty his bladder. Sir James Paget first drew marked attention to this form of obstruction to free urination, which he aptly termed "stammering of the bladder and urethra." He pointed out that it might be known by observing the exact parallelism between the difficulty of expelling urine and that of expelling the air in the ordinary speech stammering. His clinical pictures of the slight and severe grades of the trouble are graphic and worth quoting. Sir James says:

The patient can often pass his urine without trouble, especially at customary times and places, and when he does so the stream is full and strong and he has nothing the matter with him. But he is in trouble if anyone is looking at him or if he is hurried, as at a railway station. At other times he suffers all the distress that he might have with a very bad urethral stricture. He cannot pass a drop of urine, or after a few drops there comes a painful check, and the more he strains the less he passes; and then complete retention may ensue and over-filling of the bladder.

"I might add," says Sir James, "many more notes of seeming caprices of the stammering bladder and urethra; but it may suffice to say that nearly all the phenomena of stammering speech find in them a parallel. In both, alike, there is usually a history of the difficulty having been felt in early life; in both, alike, are observed the strong influences of habit and association of ideas; the effect of transient changes in the vigour of the nervous system; the need of a justly and yet almost unconsciously measured exercise of the will that it should be neither more nor less than enough; and the influence of distraction of mind. And equally in both classes of patient may be noticed the coincident general sensitiveness of the nervous system and the family relationship with persons who suffer various other forms of nervous disorder."

Subsequent writers upon this subject have rather tended to confuse the subject by including under the term of stammerer quite a variety of cases of difficult urination which do not rightly belong to the class.

It would be better to let the term "true stammering of the bladder and urethra" be confined to that class of patient, male or female, in which urination cannot be effected at will, although all the organs for the completion of the act are sound and anatomically perfect.

Let the term false stammering include those cases of prostatic inflammation or senile enlargement, or atony of

* Extract from a clinical lecture on Spasms of the Urinary Tract Musculature.