THE HUNTERIAN LECTURES ON THE SURGERY OF THE KIDNEY.

Delivered at the Royal College of Surgeons of England,

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LECTURE III (*continued*).

THE TECHNIQUE OF THE OPERATION FOR EXPLORING THE KIDNEY AND URETER.

THE method I adopt for exploring the kidney and ureter for stone is the following :

In the first place, if there is the least reason for thinking a stone has descended along the ureter, I make a digital examination of the rectum, and sound the bladder under an anæsthetic. With the finger of the left hand in the rectum, well pressed against the base of the bladder, I pass the beak of the sound across the vesical orifices of the ureters. In the female a similar examination is made of the vagina and bladder; and, if necessary, the urethra is dilated and the interior of the bladder is digitally examined and inspected by means of Kelly's tubes and the electric light, and the ureters are catheterised from the bladder. But this is rarely needful or helpful, and as a rule causes an unnecessary waste of time. The kidney to be first explored should be that on the side of the pain. This should be a rule of practice. Though it is true, as I have shown in the second lecture, that relief of symptoms (pain, fever, nervous disturbance, etc.) may co-incidentally follow the extraction of a calculus from the opposite organ, still this is no proof that the kidney or ureter on the side complained of is not the one in which the exciting cause of the symptoms is present.

The incision I have from the first always employed is a very oblique lumbar one, commencing an inch above and in front of the anterior superior iliac spine, and continued outwards and backwards to the outer edge of the erector spinæ muscle, about a finger's breadth below the last rib. The length of the incision varies with the figure and degree of stoutness of the individual. More frequently than not it is unnecessary to begin so far forward; and sometimes it is advantageous to continue the skin incision backwards a little over the erector spinæ muscle. The direction of the lumbar incision is, however, always in the line between the points mentioned. When more room is required, a short vertical or slightly curved incision is made upwards from the oblique wound, extending over the back of the twelfth rib. This greatly facilitates deep manipulation, and is a step towards clearing the last rib in the event of the excision of that bone being requisite. Manipulation is also sometimes facilitated by snicking the outer edge of the quadratus lumborum, and even that of the erector spinæ. The latter very rarely needs to be interfered with, and if divided should be sutured at the end of the operation.

When more room in front is required either for freeing or inspecting the kidney, controlling bleeding in the deep part of the wound, or for tracing the ureter, the incision should be carried in a curvilinear way towards Poupart's ligament, and then forward parallel to and an inch above that ligament, as far as the internal abdominal ring, or further. Bleeding points should be controlled as they occur by torsion pressure forceps, and if the last dorsal or the ilio-hypogastric nerve is in the way, it is best to excise an inch or more of it. After the division of the transversalis fascia, a look-out should be kept for the colon, which frequently bulges into the wound and requires to be held aside by a broad retractor. With the forefinger the back of the kidney should now be felt, covered by its loose fibro-cellular investment. By means of two pairs of long forceps this investment is seized and dragged up into the wound and divided with scissors between the forceps. Then at once bulges out, through the little opening, the fine canary-yellow fat which immediately invests the kidney. Into this opening in the thin fibro-cellular investment the tip of first one, then of the other, index fingers should be inserted, and it and the included fat should be torn open and carefully detached from the kidney. The renal pelvis and upper end of the ureter should be palpated before the kidney has been much disturbed from its position, in order to search

for any small calculus, and, if one be present, to prevent it from dropping into the ureter during the act of drawing the kidney on to the surface of the loin. When freed of its connections anteriorly, posteriorly, and at both its ends, the kidney should be brought bodily on to the surface of the loin. This in a large number of persons can be done without difficulty and without causing tension of the renal pedicle; but in others, with thick-set trunks and very fat parietes, it is not possible to bring the kidney quite out of the body, even when great traction is made upon the pedicle. Forceful pulling upon the pedicle, however, must be avoided. When, owing to these conditions, the kidney cannot be brought out of the wound, the wound should be made amply large enough to allow the surgeon to see clearly the kidney which he is about to incise. Unless this is done, there is always the risk of wounding the branch of the renal artery or vein which run over the back of the renal pelvis before entering the parenchyma on the posterior surface of the organ. Moreover, small branches of the renal artery anastomosing with the lumbar vessels may be wounded, and should be seen to be ligature. If no calculus is felt, an incision is next made into the kidney along its convex border, whilst the finger and thumb of the left hand steady the kidney and compress the pedicle. This compression of the pedicle serves a double purpose: (1) it limits hæmorrhage, and (2) it prevents a small calculus, which might drop out of one of the calyces, from falling into the ureter. Through the wound in the kidney the right index finger is introduced, and a careful detailed manipulation is made of every part of the interior of the organ. Needling the kidney for diagnostic purposes is most unreliable and should be abandoned.

Whether or not a calculus be found in the kidney, the ureter should always be catheterised from end to end, to test if its lumen is quite free. If this is not done, a small calculus—say, of one and a-half or two grains or more in weight—may be missed.

If the ureteral catheter can be passed readily through the renal cavity by way of the incision in the convex border of the kidney, this should be done; but it is often impossible or troublesome to hit off the orifice of the ureter in this way. If so, the back of the infundibulum should be cleared, and a minute longitudinal incision should be made into it with the point of a narrow sharp scalpel or sharp-pointed scissors, and through this incision the catheter should be conducted (see figures in Lecture I). In doing this, care must be used not to mistake the renal vein, or a branch of the vein, for the renal pelvis. Should such an error be made, bleeding will readily be controlled by pinching up the edges of the tiny wound, and applying a circular ligature. When any doubt arises, the vein will be distinguished by watching for the return of blood after compressing the tube supposed to be the ureter.

There is often quite a plexus of fine blood vessels on the surface of the infundibulum and ureteral wall which must be avoided if possible.

If there be a stone in the ureter, the catheter will be obstructed at the point of impaction. In the male, whether this point be in the abdominal or the pelvic course of the ureter, the calculus can be reached and removed retroperitoneally, by prolonging the anterior or lower end of the incision in the direction mentioned before.

In the female the same procedure answers for the abdominal and first portion of the pelvic course of the ureter; but for the removal of a calculus from the ureter within the broad ligament, especially near the uterus or vagina, the vaginal or sacral route is the best. If situated quite at the vesical orifice of the ureter, it can be extracted through the bladder after dilating the urethra, and, if needful, slightly incising the ureteral orifice. No attempt should be made to extract a calculus through the bladder unless it be situated quite at the internal opening. A calculus, if it is of fair size, may be felt through the bladder, when it is in the ureter just above the point where the duct enters the vesical wall (see Figure 21). When here, it cannot be so removed without exposing the patient to the danger of an intraperitoneal urinary fistula.

In one of the recorded cases of uretero-lithotomy this accident happened, and the patient died.

In the male the sacral method might also be employed for a stone situated just above the bladder; but the retro-

peritoneal inguinal route through which it is possible to trace the ureter quite up to the point where it enters the vesical wall is to be preferred.

Fig. 20.—Siccated kidney caused by obstruction in the ureter (Westminster Hospital Museum).

Fig. 21.—Base of bladder with stone impacted in ureter immediately above it; from the same patient as the kidney illustrated in Fig. 20 (Westminster Hospital Museum).

When the part of the ureter in which the calculus is situated has been reached, the wall of the ureter should be divided by a short longitudinal incision made either upon the calculus or immediately above it. The calculus should then be extruded through this opening. If the stone is impacted below the brim of the pelvis, it should, if possible, be made to retrace its steps by gentle pressure till it is brought up into the duct above the pelvic brim. If the ureter is dilated above the stone, and the stone can be readily pushed back into the dilated portion, this should be done, whether the point of impaction is above or below the brim of the pelvis. The incision in the dilated tube may then be closed by one or two Lembert sutures passed across the line of the incision. Otherwise the stone must be directly cut upon where it is impacted, and as the tissues of the ureter are likely to be much contused, perhaps ulcerated, owing to the pressure of the calculus, they may not be in a favourable state for immediate repair, and therefore sutures for the ureteral wound may be of very doubtful utility, or even harmful. Care should be taken to provide drainage for any urine which may extravasate through the ureteral wound, otherwise serious mischief in the pelvic cellular tissue may occur after the too early closure of the external wound, as happened in a case referred to in Lecture II.

In the greater number of cases, when the calculus is not in the kidney it is in the ureter, within an inch or two of the infundibulum. In several cases I have pressed a stone upwards out of the ureter, and removed it through an incision in the wall of the renal pelvis.

It is, I think, quite immaterial whether a calculus is removed through the parenchyma or infundibulum of the kidney. I formerly was of opinion that there was less chance of urine escaping, and quicker healing of the wound, when the incision involved the parenchyma only. But since employing sutures, which I began to do several years ago, I do not find that the wounds in the renal pelvis or ureter heal any the less readily.

In operating upon the sound kidney I do not hesitate to cut directly down upon a calculus, wherever it may present; still less need one do so in a kidney the cavity of which is pouched and the parenchyma atrophied. When so made the incision should preferably radiate from the hilum; but when the parenchyma is very thin, and a large branched calculus or several calculi are present, the incision may be made in any direction which gives the greatest facility for extracting the stones. In calculous pyonephrosis I have removed seven stones through as many separate incisions in the thin parenchyma. After the removal of the calculus the rest of the kidney can be explored through this incision, or, if not, a second incision should be made in the convex border of the organ.

As long ago as 1829 Gerdy¹ had advised that the convex border of the kidney should be selected for incision in nephrotomy. The advantages, depending on the anatomical arrangement of the blood vessels within the kidney, of an incision along this border are considerable. Moreover, through no other single incision can a complete examination of the cavity and substance of the kidney be so conveniently made.

It is the opinion of Barth² and Tuffier that the extent of parenchymal degeneration about nephrotomy wounds depends chiefly on the size of the vessels divided; and if this be so, it is a further reason for making the incision, as Gerdy advised, along the convex margin.

After removing a calculus from the renal pelvis, if the convex border has not been incised, the interior of the kidney should be palpated either through the opening, or, if this be too small to admit the finger, then by invaginating the infundibulum.

I have taken out some very large stones, weighing between 800 and 900 gr., through incisions in the dilated infundibulum large enough to admit readily the tips of two fingers. In such cases an incision in the convexity of the organ for examination purposes is quite unnecessary. In some cases, indeed, the calculus is so bound down into the renal cavity by thick fibrous bands between the calyces that its extraction would be most difficult through an incision in the renal substance, whereas it is readily removed through the infundibulum. (See Figs. 22 and 23.)

I have repeatedly extracted calculi through the anterior as well as through the posterior wall of the renal pelvis without a drop of urine subsequently escaping through the loin wound. This result may safely be expected provided the renal opening has been closed by Lembert sutures passed transversely.

If sutures are not used, it is better, if convenient, to open the anterior rather than the posterior surface, because the urine, as it courses along upon the posterior wall of the duct, when the patient is recumbent, is less likely to escape through an incision in the anterior—that is, the upper—wall of the passage.

In advanced pyonephrosis I have not always used sutures after nephrotomy, and it has often been a matter of surprise how readily some of these cases recover without having even a temporary urinary fistula. Suppuration in the renal cavity is by no means always a sufficient reason for not using sutures and for not making an attempt to obtain immediate union.

Fenger, whose opinion in renal surgery commands attention, does not believe that a kidney with a stone in its pelvis is in any case really aseptic, and he warns against the employment of sutures or making an attempt to secure primary union. He relates a case in support of this contention; but neither the case nor the arguments are convincing.

Fig. 22. Kidney with uric acid calculus impacted in pelvis (Westminster Hospital Museum).

Fig. 23. The same kidney seen from within with uric acid calculus impacted in pelvis and bound down by fibrous bands (Westminster Hospital Museum).

When the renal cavity is sacculated and suppurating, it should be freely irrigated with a hot, weak solution of Condy's fluid, perchloride, or carbolic acid. In a few instances the calyces have been found packed with a putty-like mass of muco-pus, which was thoroughly cleared out with the finger and little swabs of cotton wool.

In every case a drainage tube is inserted into the wound around the kidney, but not into the kidney cavity itself. I prefer a tube to iodoform gauze; the latter, by sucking up and retaining the serum and blood, keeps the surfaces of the wound apart, and prevents immediate healing.

In closing the parietal wound I transfix the whole of the layers, skin, muscle, and fasciæ, with the same sutures carried by means of Hagedorn's large curved needles. I have for some considerable time abandoned the use of buried sutures for the separate layers of muscles and fasciæ.

The length of time required for convalescence of course varies. In cases of simple nephrolithotomy patients are often able to sit up on the eleventh or twelfth day, with their

wounds healed; and many have returned to their houses between the second and third weeks after the operation. Nephrectomy is frequently as rapidly followed by complete recovery. When the kidney and the perinephric tissues are much disorganised, healing is apt to take place for the most part by granulations, and then four or five weeks are required.

It now only remains for me to express the hope that the scope of these lectures has not seemed to those who have listened to them to be altogether inadequate to the title under which they have been announced.

I had, in the first place, intended to give my personal experience of the several different renal affections which it has been my lot to treat surgically; but when I came face to face with my materials, I found that to do so would necessitate a very cursory survey of a considerable number of subjects.

I therefore preferred to lay before you in tabular form a brief abstract of 267 operations which I have performed upon the kidney, and to limit the lectures themselves to calculous disorders.

REFERENCES.

- ¹ *Anatomie des Formes Extérieures du Corps Humain*, Paris, 1829. ² *Arch. f. klin. Chir.*, Von Langenbeck, 1893, xlv, 418.

MECHANICAL IMPEDIMENT TO RESPIRATION DURING ANÆSTHESIA, ETC.

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THAT the *alæ nasi* and flaccid lips often obstruct the entrance of air into the lungs during anæsthesia is a fact well known to those who have frequently given anæsthetics; but the obstruction thus offered is nothing in comparison with the obstruction caused by the tongue and the epiglottis valving against the posterior pharyngeal wall during the inspiratory efforts of the unconscious individual.

In deep anæsthesia, a condition bordering on death, all the muscles which pass between the lower jaw and the hyoid bone gradually lose their tone, and become relaxed to such an extent that the hyoid bone, with the tongue and epiglottis, fall backwards, moving on the thyro-hyoid membrane as a hinge, until they actually come in contact with the posterior pharyngeal wall, and may remain fixed there at the end of an expiratory effort, thus entirely preventing the ingress of air at the next inspiratory effort (see Fig. 1).

Fig. 1.—From a photograph of a dead body, showing the curved line (a) that exists between the chin and the upper border of the thyroid cartilage in the middle line. In this case examination showed that the tongue was lying in contact with the pharyngeal wall.

The simplest and most reliable way of removing all such obstructions at one and the same time is as follows:

Allow the head of the insensible patient to fall back over the end of the operating table, or place a pillow or two under his shoulders, and thus allow the head to fall back as far as possible. Then insert the handle of an ordinary tablespoon, or of a fork (instruments generally at hand) between the teeth, and push it downwards and backwards on