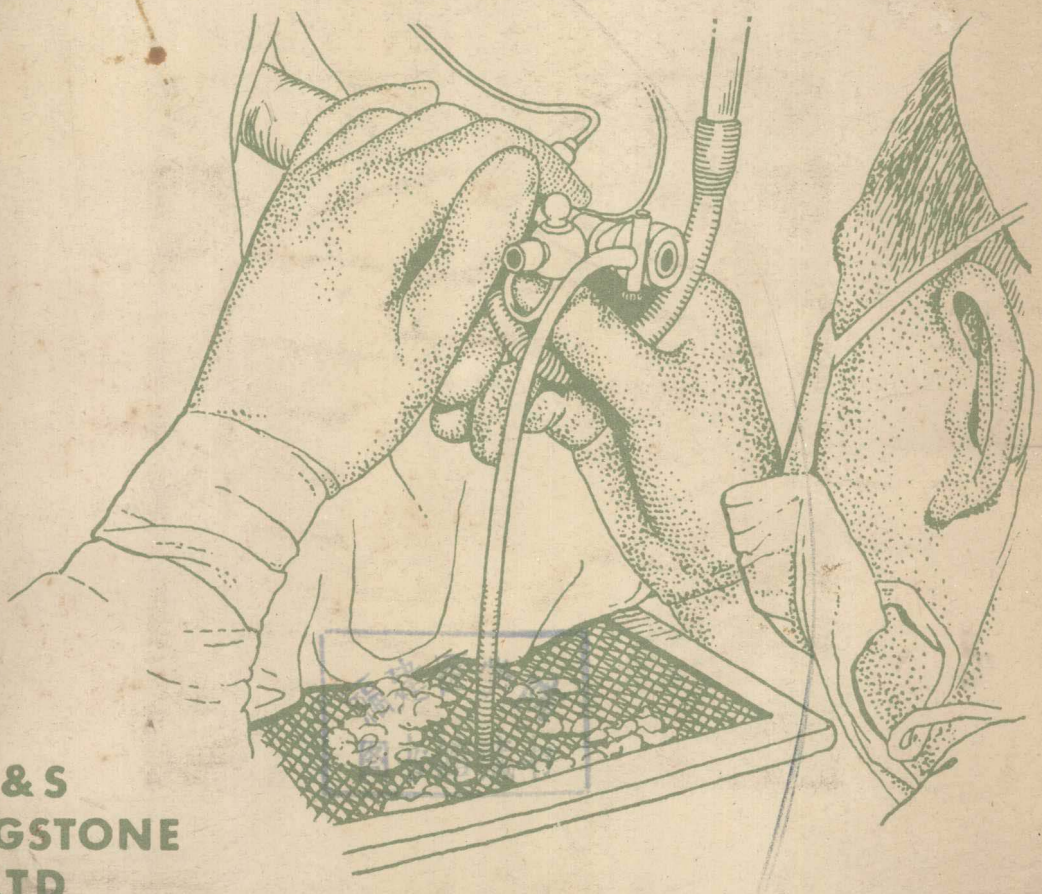
John Swinney
D. P. Hammersley

Handbook Of Operative Urological Surgery



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A Handbook of
Operative Urological Surgery

BY

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PREFACE

In this volume no attempt has been made to give a complete account of all the operations that are available to treat disorders of the genito-urinary system. We have tried to present a description of those operations which we have found to be of most use in our surgical practice, and which have given the best results in our hands.

Each section of the genito-urinary system is considered separately, preceded by a brief account of the practical points to note in the anatomy and physiology. The different techniques of approaching the various organs of the system is first given, followed by an account of the operations used in the treatment of the diseases found in them. The illustrations are numerous and detailed and should be read with the text, and it is hoped that this book will be of value to senior students and those taking higher examinations in surgery, as well as a practical handbook for surgeons without special urological training.

Our thanks are due to Professor A. G. R. Lowdon, Professor of Surgery in the University of Newcastle upon Tyne, who kindly read the proofs, and devoted much of his valuable time to the task.

JOHN SWINNEY.

D. P. HAMMERSLEY.

Newcastle upon Tyne, 1963.

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SECTION I

THE KIDNEY

General Considerations

During the last few years conservative surgery for the treatment of renal disease has become commonplace and numerous techniques have been devised to correct a variety of renal conditions. The removal of a kidney is usually a straightforward operation which gives uniformly good results, but it presupposes that the other kidney is healthy. The remaining kidney, however, in later years is liable to undergo pathological changes in its turn, making the treatment of such a patient very difficult and dangerous. If operations can be developed which will remove the disease from a kidney and leave the remainder healthy, the outlook for that patient will be greatly improved.

The preparation of a patient for a kidney operation is usually simple, but it demands a careful assessment of the opposite kidney to make sure that it is functioning normally. The patient should be admitted twenty-four hours or more before surgery is contemplated, and the usual general preparation of bowels and skin made. It is wise to have the blood grouped and a transfusion available at short notice in case bleeding is excessive ; particularly is this true in conservative operations. When the renal parenchyma is incised there is oozing from the raw surface of the kidney until the renal tissue is reconstructed, but bleeding vessels can be cauterised or ligatured. Even when the renal pedicle is clamped temporarily some blood loss occurs.

After operation on a kidney it is important to observe the urinary output to make sure that the remaining kidney and the portion left behind in conservative operations are functioning adequately, and electrolyte studies should be made at intervals.

Conservative operations usually cause considerably more discomfort for a longer period at the site of operation than does total nephrectomy, which usually runs an uncomplicated course, the pain and discomfort rapidly disappearing. In either case early ambulation is advisable and speeds the patient's recovery.

It is usually wise to leave a tissue drain down to the operation site in any kidney procedure to drain the nephric fossa. It fills with serum and fluid fat, and usually discharges for a day or two. In conservative operations drainage is necessary for the discharge of any urine which might leak from the renal parenchyma, or from incisions in the pelvis or upper ureter. It is wise to leave the drain intact and not mobilise it until discharge has almost ceased, when it can be removed gradually so that the track heals from the depths to the surface and does not heal first at skin level and block the egress of any discharge.

In renal operations, again particularly in conservative surgery, certain complications are likely to develop in the immediate post-operative period. Severe hæmorrhage may occur during a kidney operation, but reactionary hæmorrhage occasionally necessitates active exploration of the operation site in the first twenty-four-hour period. Later, usually

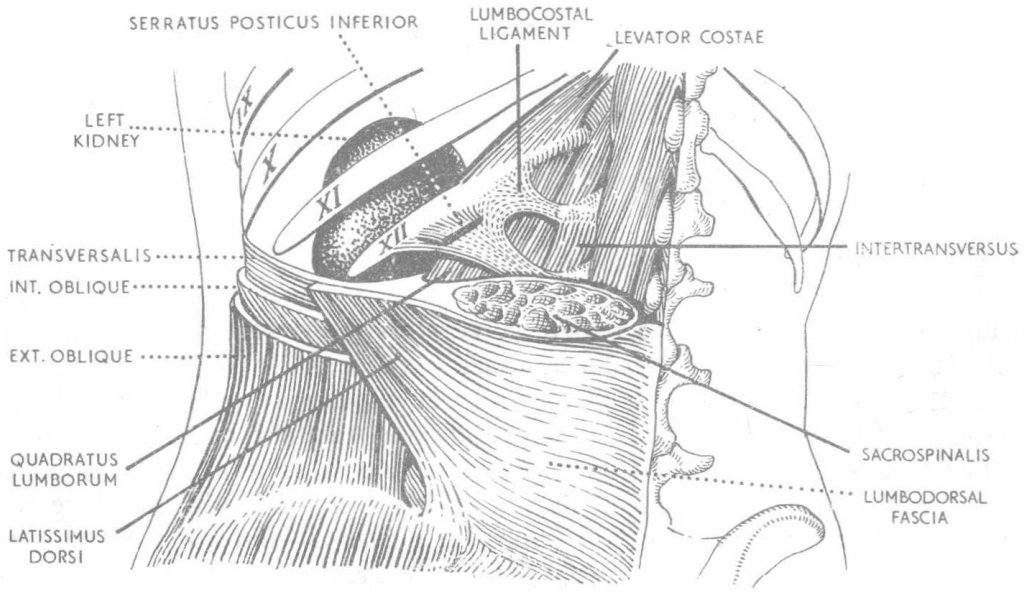

FIG. 1

Posterior Relations of the Left Kidney.

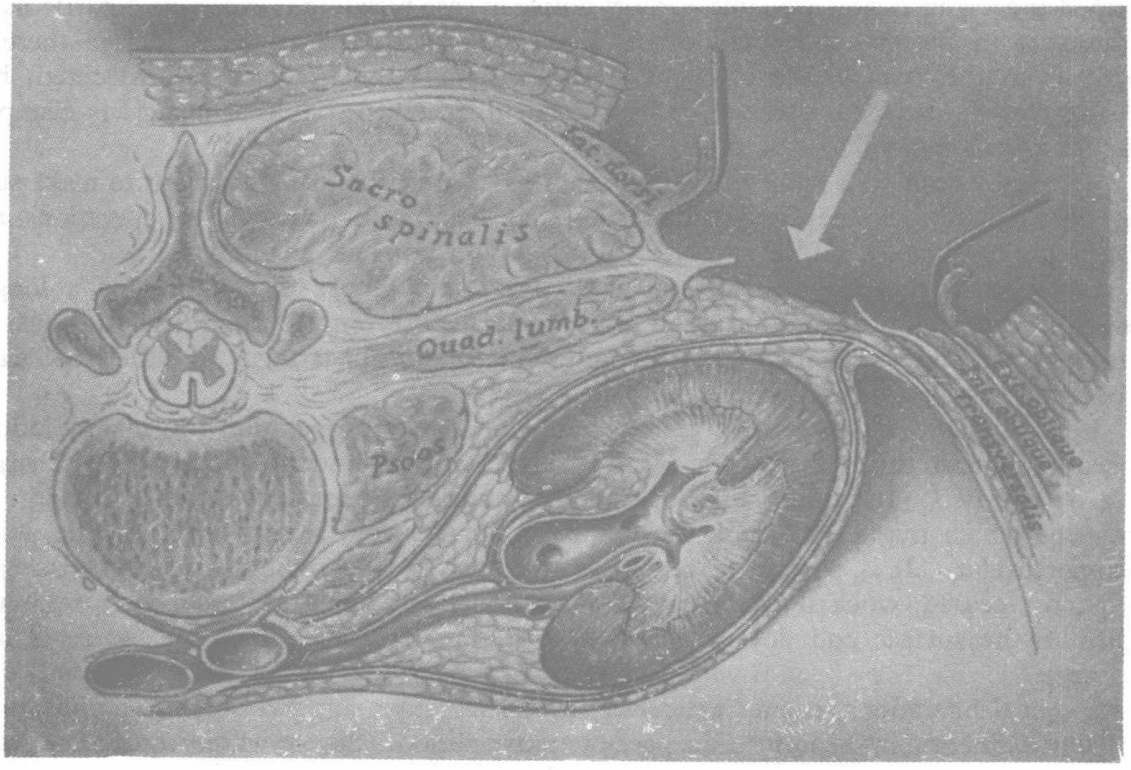

FIG. 2

Coronal Section through the Left Kidney.

during the tenth to twelfth day, a secondary hæmorrhage may occur in conservative cases and shows itself by severe hæmaturia and also pain in the loin, due to clot retention in the renal pelvis. A few such cases require nephrectomy to save the patient's life.

Gastric dilatation or paralytic ileus may also occur. The former is easily recognised by the sudden onset of profuse vomiting of large quantities of brown fluid which may be projectile, causing the patient to become rapidly ill and collapsed. The condition is easily treated by aspirating the stomach with a gastric tube and replacing the lost fluids by intravenous therapy.

Paralytic ileus is uncommon, but may cause vomiting and dilatation of the abdomen, and is also treated by gastric suction and intravenous fluids.

Chest complications occur slightly later, usually about the third or fourth day on the operated side, and are due to collapse or consolidation of the lower lobe of the lung, associated with the inability of the diaphragm to move freely, largely because of the pain. For these reasons physiotherapy and breathing exercises are commenced immediately after the operation to help minimise these complications. Early ambulation also is a good prophylactic measure.

At a later period wound sepsis may occur, but unless the perinephric space is infected pre-operatively, this is unlikely. Thrombosis in the leg veins may develop and give rise to pulmonary embolus or swelling of the legs and pain. Again early ambulation minimises these complications.

Surgical Anatomy of the Kidney

Before embarking on any operation on the urinary tract a mental picture of the kidney lying within the body and its markings on the surface should be clear to the operator, and this mental impression is confirmed by the pre-operative X-rays, which show the position of the kidneys within the abdomen.

The abdominal cavity is outlined above by the xiphoid process and the lower ribs and cartilages; by the midline abdominal furrow and the rectus medially; the upper border of the pubis, the pubic crest and tubercle, the inguinal ligament, the anterior-superior iliac spine, and the iliac crest below. Posteriorly the spinous processes of the lumbar vertebræ mark the limits of the abdominal cavity, and the kidney must be approached through the space between the lower ribs and the upper border of the iliac crest.

There are certain muscles occupying this space in the abdominal wall which are of importance (Fig. 1). The latissimus dorsi can be seen as a rounded edge starting from the iliac crest below, a little lateral to the sacral spines and slanting obliquely forwards and upwards towards the axilla. It is separated below at the iliac crest from the posterior border of the external oblique muscle by a small triangular interval—the lumbar triangle—the floor of which is formed by the internal oblique muscle. At the apex of the triangle the posterior margin of the external oblique passes under the lateral edge of the latissimus dorsi. With the arm elevated above the head, the lower serrations of the serratus anterior can sometimes be seen in thin persons interdigitating with the external oblique muscles as the latissimus dorsi is drawn backwards.

On either side of the spinous processes of the lumbar vertebræ the rounded bodies of the sacrospinalis muscle can be seen, the lateral border of which merges with the origin

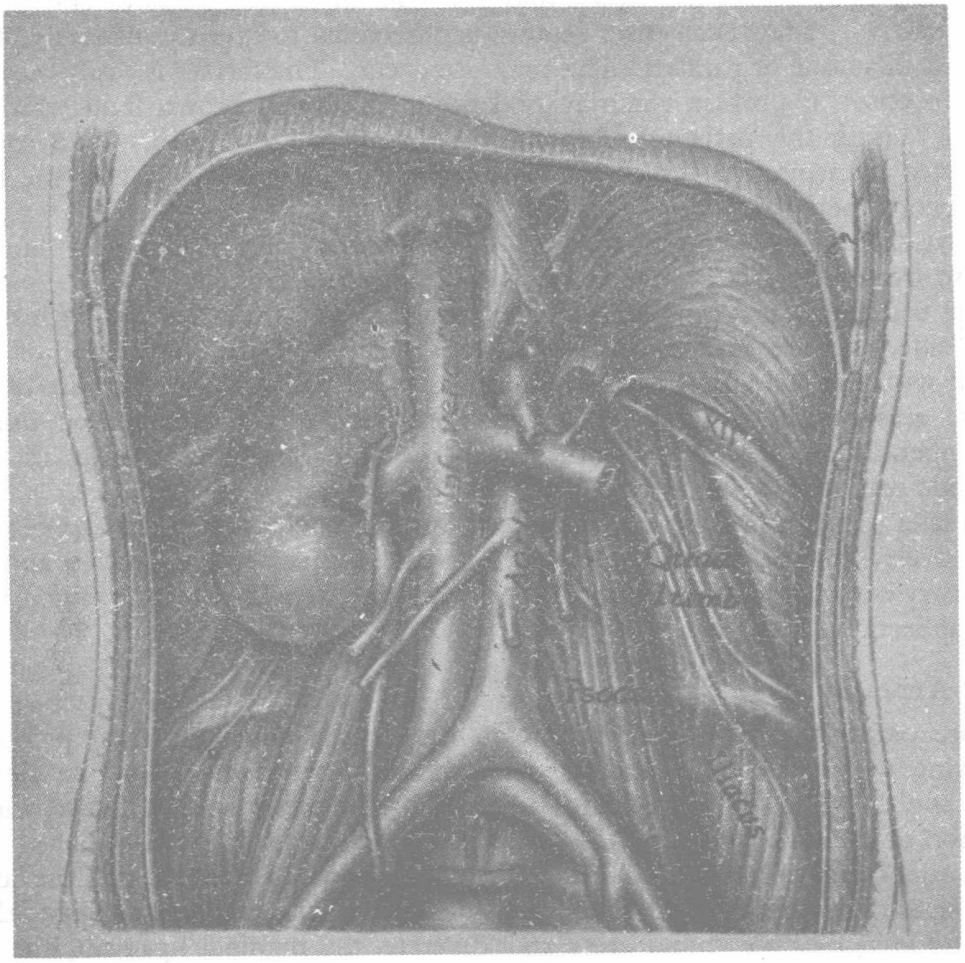

FIG. 3

Posterior Abdominal Wall showing the Bed of the Left Kidney.

of the latissimus dorsi. The highest point on the iliac crest is on a level with the spinous process of the fourth lumbar vertebra, and below this level the rounded bodies of the sacrospinalis muscles taper to a point on the dorsal surface of the sacrum.

In the area indicated the kidneys can be outlined, the right kidney usually lying about a centimetre lower than the left, but for practical purposes the surface markings of the kidneys may be taken as the same. On the anterior abdominal wall the hilum of the kidney lies on the transpyloric plane of the body, 5 cm. from the midline. Addison stated that one-third of the right kidney and two-fifths of the left are above the transpyloric plane, and one-third of the right kidney and two-fifths of the left are on the medial side of the corresponding lateral plane.

The upper pole of the kidney lies midway between the plane of the lower end of the

body of the sternum and the transpyloric line 5 cm. from the midline, while the lower pole is situated between the transpyloric plane and the transtubercular plane 7 cm. from the midline.

On the back the kidney can be marked out using the parallelogram of Morris. Two vertical lines are drawn, the first 2·5 cm. and the second 9·5 cm. from the midline. The parallelogram is completed by two horizontal lines, one drawn at a level of the tip of the spinous process of the eleventh thoracic vertebra and the other at the level of the lower border of the spinous process of the third lumbar vertebra, while the hilum is 5 cm. from the midline, at the level of the spinous process of the first lumbar vertebra. These surface markings on the front and back of the body are sufficiently accurate for practical purposes, but when very exact localisation of the kidney is required fluoroscopy with a grid marked out in squares over the lumbar region of the back is the most accurate method, and may be necessary in cases where renal biopsy is indicated.

The kidneys, which measure about 11 cm. in length and 6 cm. in breadth, are well protected as they lie in position on either side of the vertebral column, in the posterior part of the upper abdomen. The right kidney lies slightly lower than the left, but for practical purposes their upper poles are on a level with the upper border of the twelfth thoracic vertebra and their lower poles with the third lumbar vertebra. Each kidney is surrounded by loose areolar tissue and fat within a more definitely defined fascial envelope known as the renal fascia or Gerota's fascia. This, in turn, is surrounded by a further layer of extraperitoneal fat which separates it from the muscles of the abdominal wall (Fig. 2). The posterior surface of each kidney is devoid of peritoneal covering and lies successively from above downwards on the diaphragm, the medial and lateral lumbocostal arches, and below this, from the medial to the lateral side, on the psoas major, the quadratus lumborum, and the tendon of origin of the transversus abdominis. The subcostal vessels and the twelfth thoracic, iliohypogastric and ilio-inguinal nerves cross the posterior surface of the kidney between it and the muscle. Beyond the muscles both kidneys are in relationship to the twelfth rib, and on the left side the kidney usually overlaps the eleventh rib as well (Fig. 3).

In front the kidneys are both in relationship to the abdominal organs, and on both sides the medial aspect of the upper pole is related to the suprarenal glands. On the right side an extensive area of the anterior surface of the kidney is in relationship to the liver and below this the colon, while the medial aspect around the hilum is related to the duodenum directly. On the left side the spleen and stomach as well as the pancreas and jejunum are related to it.

The medial border of each kidney is concave and is hollowed out to form the hilum through which the pelvis and renal vessels emerge. The pelvis lies posterior to the vessels, and in turn the renal vein is in front of the renal artery. Where the pelvis emerges from the hilum posteriorly, it narrows gradually until it joins the ureter at the ureteropelvic junction (Fig. 4).

A coronal section of the kidney shows that the hollow pelvis breaks up in the kidney, each infundibulum terminating in the calyces, into which open the collecting tubules from the nephrons on the calyceal papillæ (Fig. 5). The renal artery divides in the hilum into its terminal lobular arteries supplying a specific number of nephrons, while the intertubular veins gradually unite in the parenchyma and join in the hilum to form the

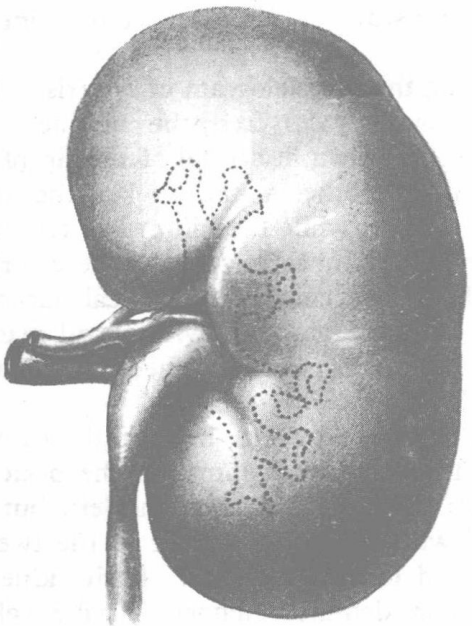

FIG. 4
Topography of Renal Pelvis and Calyces.

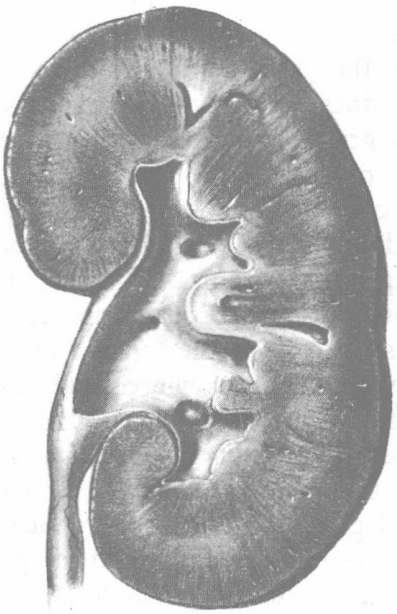

FIG. 5
Sagittal Section through the Kidney.

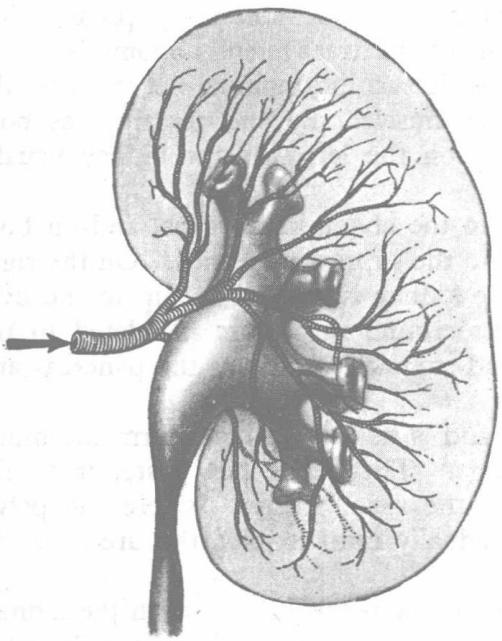

FIG. 6
Anatomy of the Renal Artery.

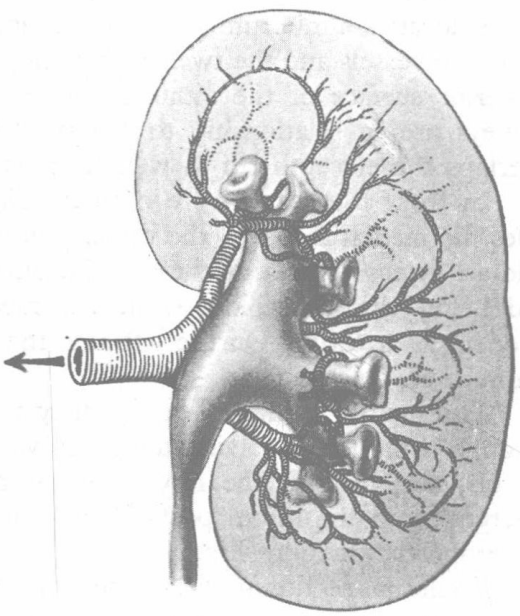

FIG. 7
Anatomy of the Renal Vein.

renal veins (Figs. 6 and 7). The lymphatics from the kidney run with the veins and end in the para-aortic nodes, but there are usually a few small nodes in the renal pedicle between the vein and the artery.

In order to reach the renal fossa on either side the abdominal wall must be incised, and this entails cutting through the external and internal oblique and transversus muscles of the abdomen, and more superficially through the latissimus dorsi and serratus anterior.

While both kidneys are mobile within the renal fascia and have an excursion of 2 or 3 cm. on deep inspiration, they are well supported by the surrounding fat, and only achieve movement beyond this distance if weight loss is severe and the support of the fatty capsule is lost. In these circumstances the kidney may become so mobile that it can be pushed down into the iliac fossa on palpation and may descend to that level when the patient assumes the upright position.

Congenital anomalies of the kidney, such as agenesis and hypoplasia, may be found on one or both sides, but in the latter the essential anatomy and physiology remain the same. When, however, the ascent of the kidney from the pelvis during fœtal life is arrested and the ectopic kidney remains in the pelvis or just above the pelvic brim, the renal fossa is empty of renal tissue and contains only fat. In these cases the kidney is fixed by its short ureter and cannot be moved up into its normal position.

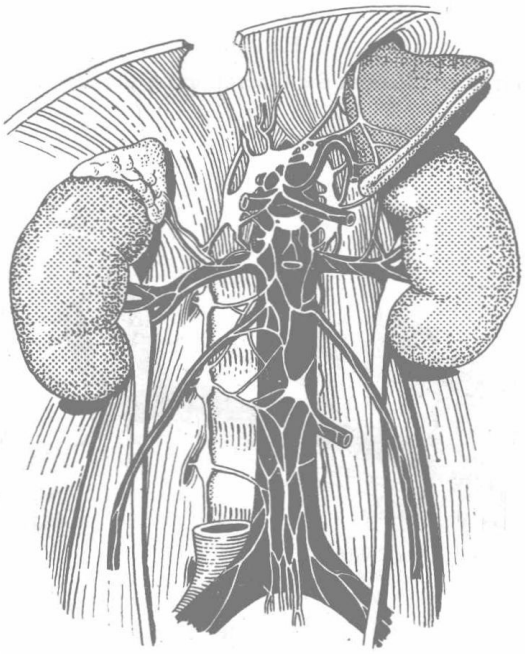

FIG. 8

Nerve Supply of the Kidneys.

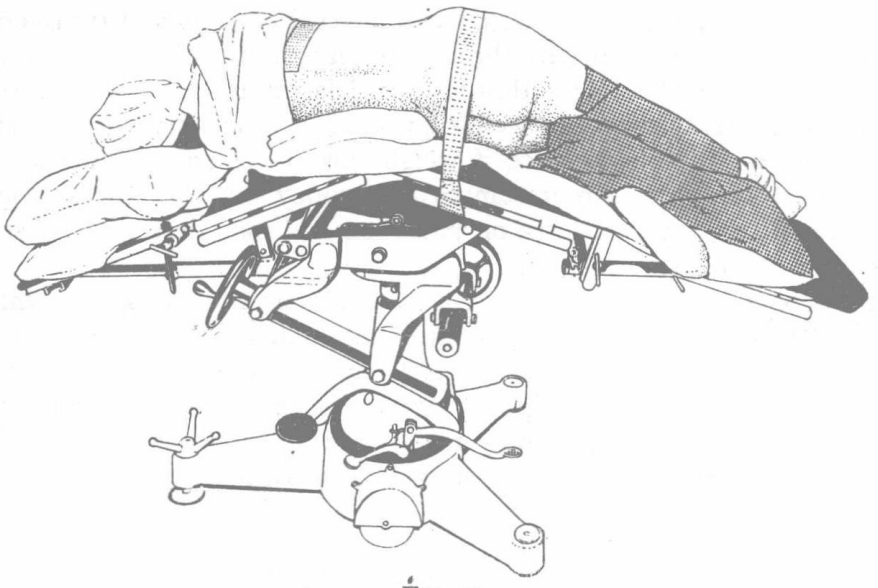

FIG. 9A

Position of the Patient for Operation on the Right Kidney.

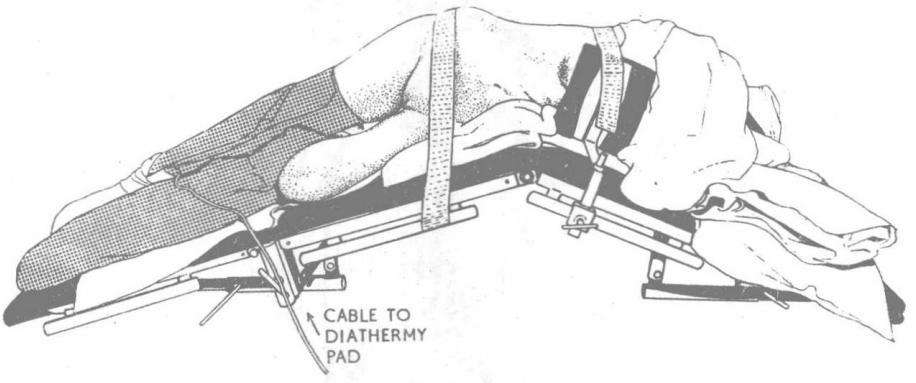

FIG. 9B

Position of the Patient for Operation on the Right Kidney.

Preparation of the Patient for Kidney Operation

The bowels should be emptied and any constipation corrected before embarking on a renal operation. This is important, because distension of the intestine, and even of the stomach, is not an uncommon sequel to kidney operations. Paralytic ileus and gastric distension can be very serious complications after operative manipulation of the kidney, and may be fatal. A mild aperient forty-eight hours before operation and an enema given the day before are worth while as prophylactic measures. The diet should be light on the day before operation, and the patient should have adequate rest.

It is important to know that the kidney on the opposite side is functioning normally, because if a nephrectomy has to be performed it may be disastrous if the other kidney has not been studied pre-operatively.

If urinary infection is present, it is as well, as a preliminary measure, to have the urine cultured and the sensitivity of the organisms studied pre-operatively, so that an appropriate sulphonamide, antibiotic, or other urinary antiseptic can be given for at least twenty-four hours before surgery. The skin of the abdomen and pubis should be shaved and carefully washed the night before operation.

APPROACHES TO THE KIDNEY

Lateral Approach

The patient should be placed on the operating table lying on the side opposite to that on which the operation is to be performed. The patient will remain stable in this position if the lower leg is flexed at the hip and knee and the upper leg extended at the hip and knee over it. The shoulder on the lower side should be brought well forward and the chest and arm supported by appropriate attachments to the operating table. The spine should be laterally extended either by an inflatable rubber bag under the flank at the level of the twelfth rib, or by angulating the operating table upwards at that level. To keep the patient in this position, and make sure he stays there, a piece of broad adhesive strapping can be stretched over the uppermost buttock and fixed underneath the table after the correct position has been achieved (Figs. 9A and 9B).

There are three incisions through the lateral abdominal wall in common use for operations on the kidney.

1. An incision made in the line of the twelfth rib from the outer border of the sacrospinalis muscle to within 2 or 3 cm. of the lateral border of the rectus muscle (Fig. 10).
2. A thoraco-abdominal incision along the line of the tenth rib, from the outer border of the sacrospinalis to the end of the rib and continued into the abdominal wall to the lateral border of the rectus sheath (Fig. 11).
3. A lumbar incision made between the costovertebral angle which is formed by the twelfth rib and the lateral border of the sacrospinalis muscle, and the anterior-superior iliac spine.

This last incision may be curved downwards above the anterior-superior iliac spine into the iliac fossa when more extensive exposure of the upper ureter is required.

The curved incision of Mayo is not now used, and of all the incisions that have been

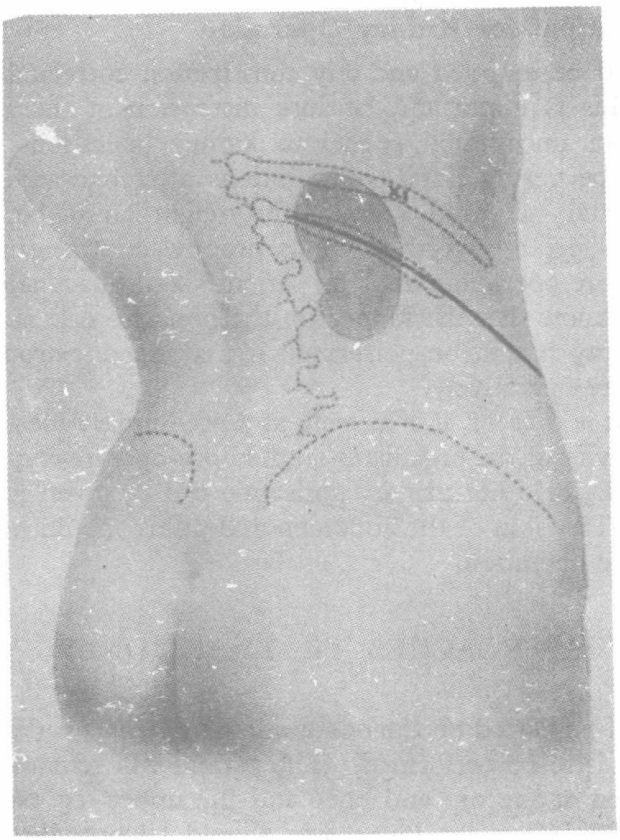

FIG. 10

Incision along the Line of the Twelfth Rib.

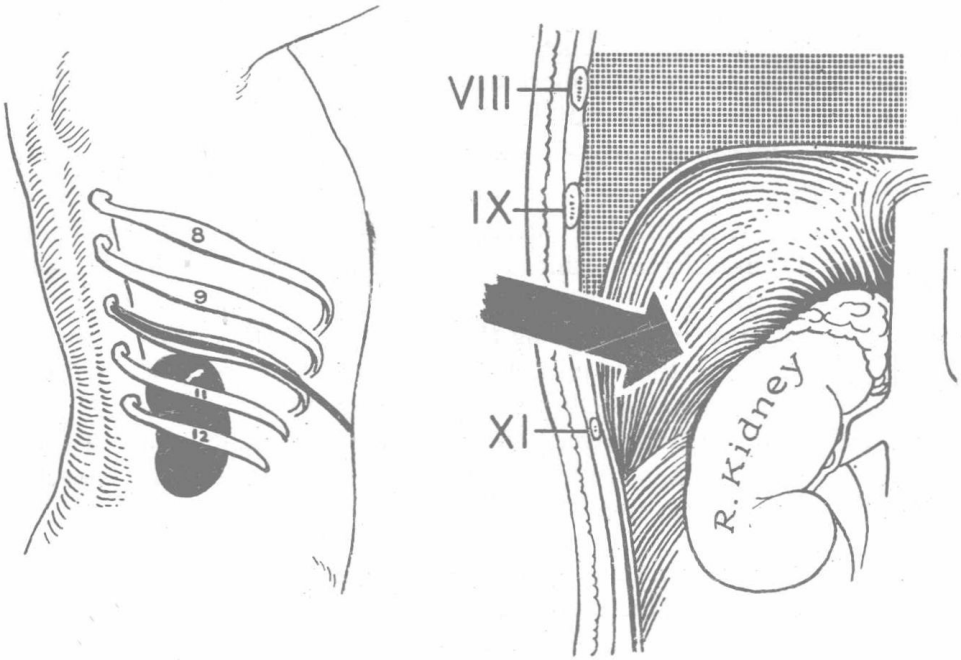

FIG. 11

Thoraco-abdominal Approach.

described in the past the three mentioned fulfil all normal purposes, but a useful variant is the incision described by Presman in which the tenth intercostal space is opened without rib excision (Presman, 1959).

For a very large tumour of the upper pole of the kidney Nagamatsu's incision is sometimes useful. This includes the lumbar incision, the posterior end of which is extended upwards over the ribs near their angles, and the ribs and lumbocostal ligaments are divided so that the lower rib framework can be turned upwards and medially (Nagamatsu, 1950).

1. **The Incision along the Line of the Twelfth Rib** (Fig. 12).—Skin and subcutaneous fascia are divided in the length of the incision, and the latissimus dorsi muscle and the posterior fibres of the external oblique's attachment to the rib are divided. Beyond the end of the rib the external oblique and internal oblique are divided to expose the transversus abdominis muscle. This aponeurosis is incised and the retroperitoneal fat extrudes. The index finger of the left hand is passed through the opening and the peritoneum separated from the inner surface of the transversus muscle anteriorly to prevent it being injured. The incision is continued through the transversus muscle and the internal and external obliques throughout the length of the wound. The periosteum on the outer surface of the twelfth rib is incised and it is removed from the surface of the rib by a periosteal elevator. At the upper and lower borders of the ribs the attachments of the intercostal muscles are separated from the rib by a sharp raspatory such as that of Semb. The Doyen's rib raspatory is used to separate the periosteum on the inner surface of the rib throughout its exposed length. In old people it may be virtually non-existent, only very thin fibrous tissue being found. When the rib is clean and free of its periosteum all round its circumference, rib shears are passed under the rib at the posterior end of the wound and the rib divided as far back as possible. The rib is lifted up in forceps and the attachments of fascia and muscle to its anterior end are freed by sharp dissection. Under the rib a few fibres of the diaphragm are exposed, and these are separated to expose the retroperitoneal fat. If further exposure is required posteriorly the fibrous sheath of the sacrospinalis may be incised and the muscle belly retracted medially. The pleural margin is usually visible at this time and should be gently pushed upwards out of the field of operation.

The retroperitoneal fat varies in thickness, depending on the obesity of the patient, and usually it can be lifted up with tenaculum forceps as a distinct fatty layer and separated by blunt dissection from the renal fascia underneath it. This fascia is well marked, forms a definite barrier to the further exposure of the kidney, and needs to be incised with a knife or scissors. It is incised in the length of the wound and the soft layer of perinephric fat is exposed. This again varies in thickness depending on the weight of the patient, but is usually easily separated from the renal capsule, and the kidney can be dissected free from it and delivered into the wound.

The upper pole of the kidney may cause difficulty because of adhesions to the suprarenal gland, and perhaps also because of an upper polar artery which is occasionally present. Care must be taken not to tear the suprarenal gland by careless dissection or to tear an upper polar artery, when troublesome hæmorrhage may be caused. If such an artery is found, it is usually ligatured and divided as it very rarely is of sufficient size to cause infarction if it is interrupted.

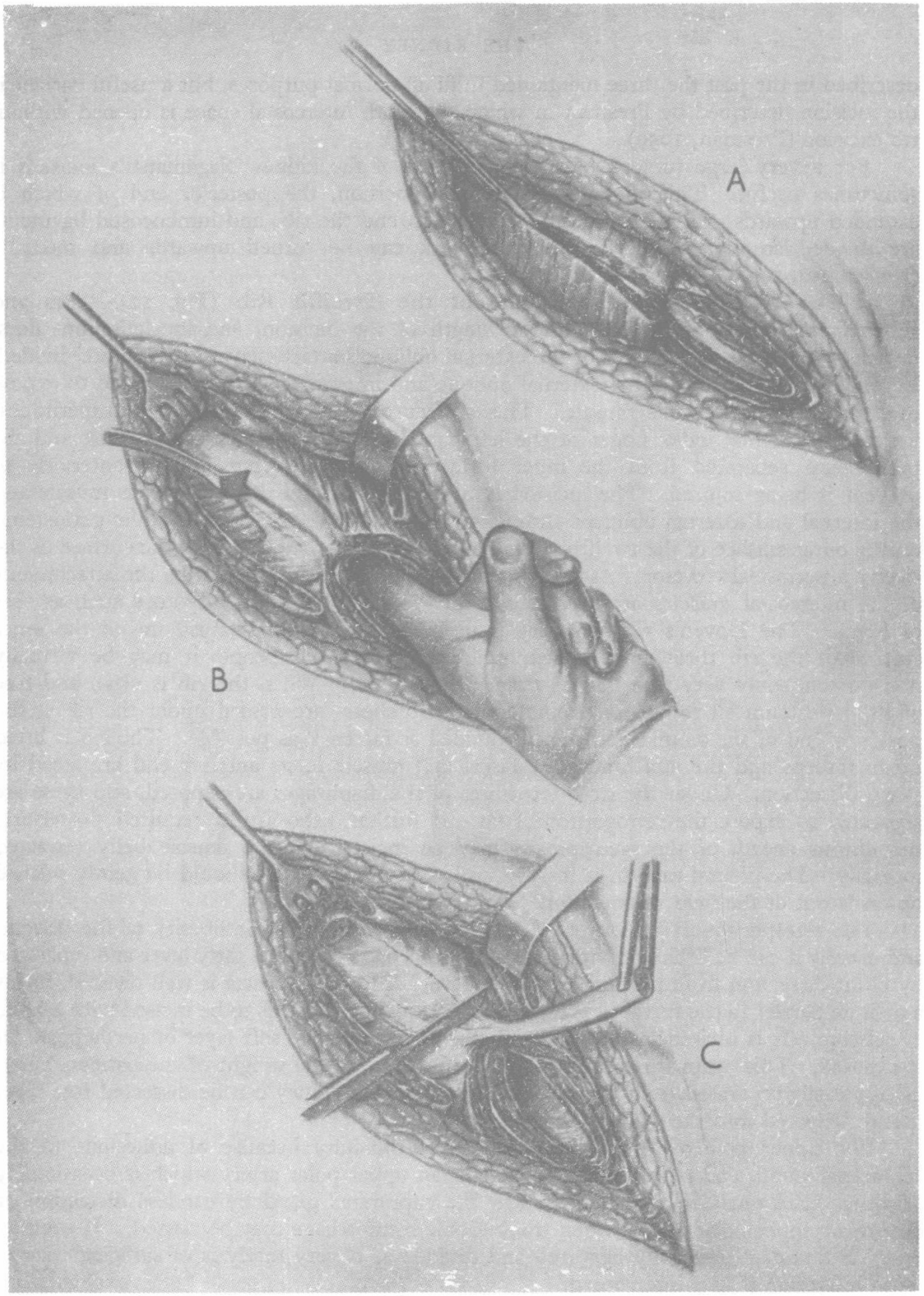

FIG. 12A

Approach to the Kidney—Twelfth Rib Incision.