A similar and even more striking case of anuria and retention of urine in a hysterical woman is recorded by Dr. Alfred Gordon.[1] There was practically complete anuria for two days, followed a few days later by an attack of complete retention. Both attacks were cured by the external application of a mixture of chloroform and alcohol, and by suggestion.

[1] Med. Record, 1900, lviii, 289.

CHAPTER XLIV

OPERATIONS UPON THE KIDNEY—RENAL FISTULA

The preliminary stage of renal surgery has passed. A surgeon is no longer justified in performing a nephrotomy or a nephrectomy according to his own whim. It is no longer proper to sacrifice a whole kidney when a part of it may be saved, nor to sacrifice any part of a kidney when the whole of it may be saved; nor is it proper to perform nephrectomy without the assurance that the opposite kidney is sound. Thus surgery of the kidney has begun to be conservative. It will doubtless progress further along the same lines. Exploratory nephrotomy is being more and more replaced by the X-ray and the ureteral catheter; and it is to be hoped that the day is not far distant when no operation shall be performed upon the kidney without a perfectly definite knowledge of the condition of that organ, so that the surgeon can make up his mind beforehand just what he intends to do, and, by the precision of his knowledge and the accuracy of his diagnosis, spare the patient that prolonged anesthesia which is so often fatal.

In the following paragraphs the more important operations upon the kidney are discussed. Special points of technic have been considered in the chapters relating to each special disease. Yet the surgeon must remember that in many cases it is impossible to perform a typical operation. One nephrorrhaphy is much the same as another, and in exploratory nephrotomy there are not many variations of technic. But when the surgeon undertakes nephrotomy or nephrectomy for the cure of the various suppurative, calculous, tubercular, and malignant diseases of the gland, his experience will suggest minor modifications proper to each case, modifications which it is impracticable and useless to enumerate. But they will all tend to the same ends—to obtain a wide operative field and, as far as possible, to save a kidney which may still be of some service.

Instruments Required.—Besides the clamps, scissors, knives, etc., necessary for any major operation, certain instruments are especially applicable to operations upon the kidney. It is well to have

two broad, deep abdominal retractors in order to hold apart the edges of the wound in case the kidney cannot be readily loosened and brought out through the lumbar incision. It is also necessary to have a slender probe, 30 cm. long, to investigate the ureter. Moreover, one or more stone forceps (Fig. 114) may be required in calculous cases, cambric needles and fine silk for plastic work upon the pelvis, and chromicized catgut or kangaroo tendon for suturing the kidney tissue. It is always well to have a number of long artery clamps, a heavy pedicle clamp, an aneurysm needle, and some braided silk, any or all of these to be used on the renal pedicle if nephrectomy is to be performed.

Preparation of the Patient.—The patient should be prepared as usual for any operation upon the urinary tract. The bowels and stomach should be empty, the skin of the abdomen and back aseptic. Urotropin should be administered for two days before the operation, and during the same period it is well to have the patient on a fluid diet, drinking large quantities of water. All these precautions are employed in order to render the urine and the operative field as clean as possible and to avert post-operative suppression.

Choice of Incision.—Every operation upon the kidney and the ureter should be performed extraperitoneally, if possible. It is only in exceptional cases of difficult nephrectomy that the intraperitoneal route is to be preferred. The reasons for preferring the extraperitoneal incision are (1) the lessened danger from sepsis, for pus may be allowed to run all through the lumbar wound with impunity so long as sufficient drainage is maintained after operation; and (2) more satisfactory exposure of the kidney obtained through the lumbar incision; so that often those surgeons who attack the largest and most adherent malignant growths habitually do so through an extraperitoneal incision, although in such cases it is usually necessary to enter the peritoneal cavity first or last. For our present purposes, however, we shall consider only the lumbar or extraperitoneal incision.

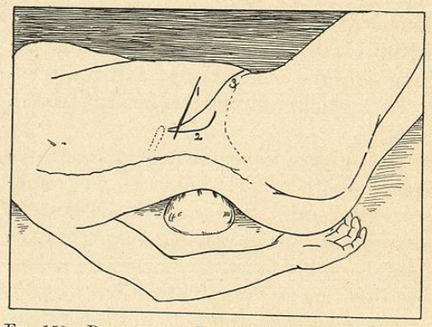

FIG. 153.—POSITION AND INCISIONS FOR RENAL OPERATION.

1, Transverse incision for nephrectomy; *2*, curved vertical incision for nephrotomy; *3*, oblique incision for nephrotomy or nephrectomy.

Position of the Patient.—The patient should lie upon the sound side in the Sims' position with hips and knees flexed, in order that the space between the ribs and the ilium may be as wide as possible. The opposite loin is forced upward by supporting it on a large pillow or on a kidney bag (Fig. 153).

NEPHROTOMY

The surgeon stands in front of the patient, who is in the Sims' position, as described above. It is best to have two assistants and at least one trained nurse, besides the anesthetist. My personal preferences on the subject of anesthesia have been suggested in a previous chapter (p. 511).

The Incision.—For simple nephropexy, exploratory nephrotomy, or nephrolithotomy, a vertical, a transverse, or an oblique incision may be employed. It often makes little difference which one is chosen, but, inasmuch as exploration of the renal pelvis and ureter may prove essential to the success of any operation, it is safer to employ an incision which may be readily extended down into the pelvis. For this purpose the oblique or curved lumbo-inguinal incision is always satisfactory, and on this account is generally employed. The surgeon feels for the extremity of the last rib and begins the incision a finger's breadth below and in front of its tip. This incision is carried obliquely downward and forward to within two fingers' breadth of the highest point of the crest of the ilium. The line of incision may be almost straight or markedly curved with its convexity backward (Fig. 153).

Having incised the skin and superficial fasciæ the external oblique muscle is exposed. This is divided in the line of its fibres. The internal oblique is then divided transversely, and the transversalis may be pulled forward and out of the way; if necessary the last dorsal nerve and vessels may be sacrificed. At this point in the operation pressure of the posterior flap backward reveals the thick rounded border of the quadratus lumborum muscle, while the bottom of the wound is closed by the glistening transversalis fascia. This is incised vertically, and immediately the perinephritic fascia presents itself. This structure resembles the subperitoneal fascia so closely as to mislead the inexperienced surgeon, and it may cause him to waste much valuable time in searching about for a means of discovering whether or not this is the peritoneum. The simplest guide is the border of the quadratus lumborum; the fascia underlying this is never peritoneal. Incision of this perinephritic fascia immediately permits the protrusion of the fatty capsule. With his

fingers the surgeon enlarges this incision and proceeds to separate the fat by blunt dissection until he reaches the kidney, which can usually be felt high up under the ribs. Exceptionally this fatty capsule is so condensed by a fibro-lipomatous inflammation that it has to be incised. Ordinarily it is easily separated from the kidney. The remainder of the operation depends upon circumstances. For a nephropexy and some other operations it is not necessary to dislocate the kidney from its bed; but, as a rule, the organ can be handled more satisfactorily and explored more thoroughly if it be liberated and protruded through the lumbar incision.

Liberation of the Kidney.—The kidney is liberated by inserting the fingers behind it, sweeping them around the lower pole, then around the upper, and finally across the front of the organ, which, when thus freed from all its capsular attachments, may usually be drawn through the lumbar incision by gentle traction.

Several precautions must, however, be observed. An inflamed kidney may often defy all attempts at liberation by reason of its adhesions and its size. The *adhesions* which bind down a kidney must be respected. A considerable amount of force may be employed in separating the adhesions behind the kidney—so long as no great traction is made upon the organ—for in this region no damage can be done; but in working about the upper pole and in clearing the anterior surface great caution must be observed in order to avoid two accidents—viz., tearing the peritoneum and rupturing renal vessels. If the adhesions cannot be freed by a reasonable amount of force the kidney had best be explored *in situ*. In order to enlarge the field of operation for this purpose an accessory incision or the resection of a rib may be necessary (p. 641).

The second obstacle to liberation of a kidney is its size. A diseased kidney may be altogether too large to be extracted through the lumbar incision. If this be the case, rather than enlarge the incision it is better to force the kidney as near as possible to the surface of the body and explore it there. Inasmuch as these large kidneys are habitually pyonephrotic or hydronephrotic, incision of the organ may sufficiently reduce it in size to permit its extraction.

In all this work of liberating the kidney, or examining it *in situ*, the manipulations may be greatly aided by pressure of a fist upon the anterior abdominal wall. Properly applied, this pressure forces the kidney up into the wound better than does any form of traction.

It is especially necessary not to pull too hard on the kidney at any time. After its extraction from the loin it is customary to hold the organ by a long strip of gauze passed around its pedicle. The sudden tearing of the kidney from its attachments by undue traction upon this gauze sling is an evident example of how easily an accidental nephrectomy may be performed when the tissues about the hilum are rendered friable by prolonged suppuration or by malignant infiltration.

Nephrotomy and Pyelotomy.—From the large amount of clinical experience accumulated during the past two decades upon the relative merits of pyelotomy and nephrotomy it may be concluded that an incision in the pelvis of the kidney will heal about as well as one through the parenchyma. The earlier authors were convinced that pelvic incisions healed badly and in the majority of instances were followed by fistula; but the reason for this belief must have been the fact that the pelvis was incised only in conditions of renal retention, when fistula followed because the ureteral obstruction had not been removed. It is good surgery to incise the kidney or its pelvis, whichever presents in the field or affords the most appropriate access to the disease in the organ. Incisions in the parenchyma of the kidney should always be made along the convex border, and, if possible, should avoid the extreme tips, both upper and lower. Especially when exploring for stone, it is the practice of many surgeons to extract the kidney through the wound, to compress the renal artery, and then to split the kidney fairly into two halves. I have never seen the necessity for this operation, and, with the advances that have been made in X-ray diagnosis, it seems less and less essential. My favourite incision enters the convex border in the lower third of the organ and admits the finger into the lower portion of the sinus. If bimanual palpation with the finger in this position is not adequate to explore all the calices a supplementary incision may be made in the upper end of the organ. The hemorrhage that follows incision of the kidney is immediate and profuse; but if incisions are restricted to the posterior border, the gush is purely venous and may be readily controlled by pressure, and later by deep catgut sutures.

The incision of pyelotomy should radiate from the ureteral orifice towards the kidney tissue, in order that its two edges shall naturally fall together when the kidney is allowed to relapse into its place. The one precaution necessary in incising the pelvis of the kidney is to be sure that it is the pelvis which is incised. The renal vein and artery, subdivided into several large branches, run across the front of the pelvis and almost completely cover it, and since in some cases of dilated kidney only the front of the pelvis is accessible, the danger of opening one of these vessels will be readily understood.

Special Manipulations.—The various methods employed in resecting a portion of the kidney or in extracting a stone do not admit of any generalization. In performing a *resection* one has only to re-

member that any amount of kidney tissue may be sacrificed; but that if a large portion of the organ is to be removed, it is convenient to preface this operation by clamping that branch of the renal artery which supplies it. After resection the cut edges of the gap are to be united by deep catgut sutures. Large, branched *calculi*, fitting closely in the pelvis, are often very hard to remove. Rather than to struggle for an indefinite period in the effort to extricate such a stone it may be preferable to enlarge the parietal incision, to split the kidney from end to end, or even to remove it. But smaller stones are more easily handled: they may be picked from the pelvis or the calices by fingers or forceps, and in any case, whether the expected stone has been found or not, *the operation should never be considered complete until a probe has been passed from the pelvis of the kidney down into the bladder.*

Finally, the wound is irrigated according to the requirements of the case, and closed. An incision in the parenchyma of the kidney is best closed by one or two deep sutures of heavy catgut or chromicized gut. For incisions in the pelvis the finest silk is preferable, the sutures being inserted so as not to include the mucous membrane. But in the majority of cases the kidney is suppurating and requires to be drained. For this drainage a rubber tube is often more satisfactory than gauze, because of the very free flow of urine usually occurring during the first days after operation. This tube is inserted into the pelvis of the kidney, and drainage is also afforded by one or two strips of gauze leading to the dependent and pocketed portions of the wound. The external wound is sutured in its lower part, and the drain is left protruding from the upper end. No fear need be felt for the subsequent integrity of the abdominal wall. I have never seen hernia follow this operation, and I do not think it at all necessary to employ the incision suggested by Senn and others—namely, a muscle-splitting process comparable to the McBurney incision for appendicitis, the kidney being approached through the space between the abdominal muscles in front and the quadratus lumborum behind, or through the abdominal muscles themselves by splitting them along the line of their fibres.

NEPHRECTOMY

It may not be amiss to repeat in this place that, unless forced to it by immediate danger to the patient's life—such an excessive hemorrhage from the renal vessels—the kidney should never be removed unless the presence and functional capacity of the other kidney has been previously ascertained by the use of the ureteral catheter. It is even proper to defer nephrectomy until after nephrotomy shall have separated the urines—the urine from one kidney passing through the wound in the loin, that from the other issuing through the urethra. Nor should nephrectomy be contemplated, except for malignant disease, for tuberculosis, for inoperable obstruction of the ureter, or for such grade of renal disintegration by calculous or other suppuration as would make the organ a menace to its possessor. Nephrectomy is, immediately and remotely, a greater shock than nephrotomy. It involves longer anesthesia, inflicts greater traumatism, and lops off a large and important though damaged viscus. Hence it may be necessary to forego a contemplated nephrectomy and be satisfied with nephrotomy for any one of several reasons. First, the functional activity of the opposite kidney may not be known; second, the patient may be so weak that it is deemed inadvisable to expose him to the shock of the greater operation; and third, the suppuration may be so severe that it is thought prudent to drain the abscess for a few weeks, and then, after the suppuration shall have abated and the patient shall have rallied, to perform the radical procedure. In these cases the choice between primary and secondary nephrectomy is often entirely a matter of personal judgment. In any case, if a secondary nephrectomy is to be performed it should not be delayed many weeks, lest the kidney acquire adhesions to the surrounding parts that may many times multiply the difficulties of nephrectomy.

Lumbar Nephrectomy.—The kidney is reached by the oblique lumbar incision described above. Liberation of the organ is performed as in nephrotomy, but when dense adhesions are encountered the issue thus raised cannot be avoided: the kidney must be removed. In order to accomplish this one of several devices may be employed:

1. **Supplementary Incisions.**—The oblique incision may be enlarged by a transverse or a vertical incision from either extremity, or instead of the oblique incision a transverse cut one inch below and parallel to the last rib may be employed. A vertical incision dropped from the posterior extremity of this gives a very wide wound. Or it may seem preferable to use the combined incision of Morris, tying the pedicle, freeing the anterior and upper adhesions, and extracting the kidney through a vertical incision in the linea semilunaris after the lower and posterior adhesions have been freed through the lumbar wound.

2. **Resection of Ribs.**—Even in difficult cases of nephrotomy it is sometimes of the greatest assistance to enlarge the field of operation by extending the cutaneous incision up over the last two ribs and