

## **Nephrorrhaphy / by William W. Keen.**

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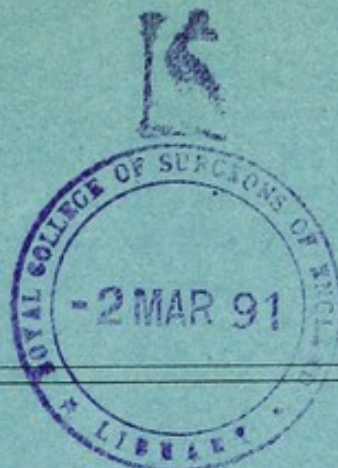
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# NEPHRORRHAPHY.

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—: BY :—

WILLIAM W. KEEN, M.D.,

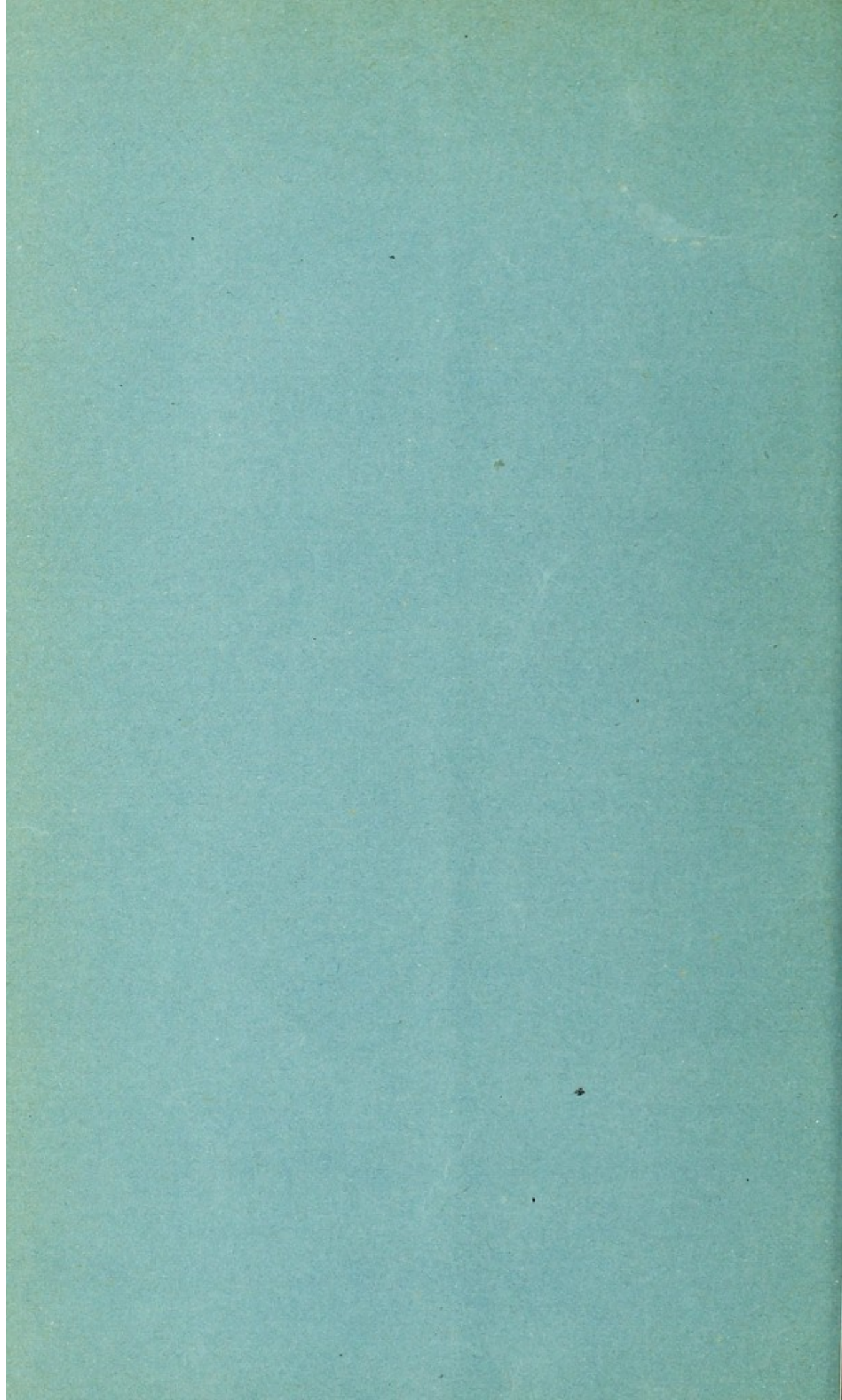
OF PHILADELPHIA,

Professor of Surgery in Jefferson Medical College.

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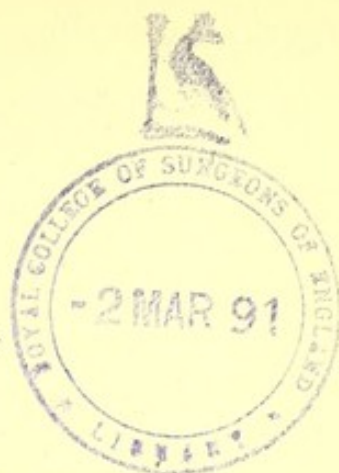


## NEPHRORRHAPHY.<sup>1</sup>

By WILLIAM W. KEEN, M.D.,

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PROFESSOR OF SURGERY IN JEFFERSON MEDICAL COLLEGE.



**M**OBILITY of the kidney exists in two varieties:

(1) Movable kidney, and (2) Floating kidney.

A sharp line of distinction is drawn between the two conditions, anatomically and morphologically.

Anatomically a floating kidney has a mesonephron formed by a reduplication of the peritoneum and, therefore, like a coil of the small intestines, lies within the peritoneal cavity.

A movable kidney lies posterior to the peritoneum and is freely movable in the retro-peritoneal space, moving either without its fatty capsule, or within this capsule.

Morphologically they are distinguished in that a floating kidney is always a congenital abnormal development, whereas a movable kidney is probably always acquired.

But however clearly we may draw the line theoretically, practically I believe the two conditions merge into each other with no sharp line of demarcation. In my own experience (which covers four operative cases) I have never seen a mesonephron during operation and yet, in two of the cases, the kidney fell easily with any change of posture into the right iliac fossa and over to the left of the middle line.

The range of motion of a movable kidney is, therefore, quite as great as could exist if it were anatomically a floating kidney; yet, from the absence of any strict mesonephron it would be classed rather as a movable kidney.

The frequency of movable kidney is certainly underrated by most surgeons. In over eleven thousand autopsies in three hospitals, quoted by Newman, only eleven cases were found. But, very naturally the condition would be overlooked, unless it were sought for; and in the dorsal position in which the au-

<sup>1</sup>Read before the American Surgical Association, May, 1890.

topsy is always made, would naturally not be discoverable, unless displacement persisted. It is therefore much more frequently detected clinically than pathologically. For example, Skorczewsky (Morris. Dis. of the Kidney, p. 27) in 1422 patients found the condition to exist in 32 woman, out of 1030 cases, and in 3 men out of 392. Drummond (*Lancet*, January 11, 1886, p. 89) has recently reported 30 cases that he himself has observed, and according to Oser, of Vienna, 10% of the women that have borne children are so affected.

With such clinical facts before us, it is impossible to deny the existence of the malady, and, as the history of the cases shows, its gravity. It is much more frequent in women than in men. Of 290 cases collected by Newman, (Sur. Dis. of the Kidney) 250 were in women, and 38 in men, about 7 to 1. Landau (*Arch. f. Klin. Chir.*, 1879), states that of 314 cases, 273 were in women, as against 41 in men, about the same proportion again.

The preponderance is greatly upon the right side. Of Landau's cases, 151 existed on the right side, 13 on the left, and 14 on both sides.

*Causes.*—Floating kidney is always a congenital affection; Newman and Morris both cite undoubted instances of the affection.

The cause of movable kidney may be a fall, a blow or other traumatism, of which a large number of cases present a clear history. That it follows and is caused by pregnancy and a consequently, lax abdominal wall, is very probable in many instances, but there are too many cases, both in men and unmarried women to assign to this the predominant role, as some authors do.

Moreover, the loss of fixation has sometimes been attributed to the disappearance or diminution of the peri-nephric fat, but so far as my own observation goes, in all the cases that I have operated upon, there was plenty of this fat; and in the last case reported in this paper, in which the mobility of the kidney in respiration was very great, there was an abundance of fatty tissue locally around the kidney, though the patient was a tall, spare man, and had fallen in weight from 165 to 130 pounds.

*Symptoms.*—Opinions as to the advisability of remedying the condition vary, from the extremes of Landau (Verhand. XI. Deutsch. Chir. Congress, 1882) who thinks that operation is never justifiable, to that of Keppler (*Arch. f. Klin. Chir.*, 1879, p. 520) who believes that a movable kidney is a constant menace to the life of the patient, and that nephrectomy should be performed as soon as the diagnosis is made. This diversity of opinion is based partly on the unsatisfactory results of the earlier operations, and, partly, it seems to me, on the want of appreciation of the serious annoyance, discomfort, pain and danger which a mobile kidney produces. These will be best appreciated by a glance at the table, and by reading the history of the three cases I here report.

Mr. Tait has operated upon but three cases, one of which, he writes me, ultimately died from the suppuration following the operation, and the others were not benefited in the least; and he declares (*Brit. Med. Jour.*, November 16, 1889) "that he will have nothing more to do with the fixation of the kidney."

As will be seen later, the death rate of the operation is but slight, and with the improved methods that have been introduced, it ought to be lessened rather than increased. The table which is appended will show, moreover, that the results as to comfort and health have been most satisfactory in the majority of the cases. I have no doubt, therefore, myself, that the operation will prove to be a distinct advance in renal surgery.

The discomforts which arise from a movable kidney are many and decided. There is much dragging pain, with a sense of weight in the loins. Gastric disturbances are extremely common. Constipation, fetid breath, sometimes vomiting, are all noticeable. Not uncommonly there will be palpitation or other cardiac symptoms. Disturbance of the generative organs in women is very frequently associated with movable kidney, and, whether as a cause, consequence or co-incidence, it is very certain that the majority of women suffering from this disorder are of a highly neurotic constitution. The discomforts are very great, and the pain may be so excessively severe and prolonged as to interfere with all occupation,

and practically to make life almost unendurable. In women, the pain is nearly always much greater during menstruation. This pain is attributed by Dunning (*Jour. Amer. Med. Assoc.*, December 19, 1885) to the traction on the capsule and renal tissue through the vessels and ureter, and he supports his belief by experiments upon the fresh kidney. The mental annoyance, also, is by no means a slight factor in the problem.

But disturbance of the functions, discomfort and pain, are not the only afflictions which attend this condition. The disorder may pass beyond the realm of bearable evils, into serious and actual danger to life itself, so that in considering the slight mortality from nephrorrhaphy, we must also bear in mind that there is a mortality attending the expectant plan as well. Thus Berry (*New Orleans Med. and Surg. Jour.*, 1889-1890, n. s. xvii, p. 18) records the case of a patient who died six weeks after the discovery of the floating kidney. He attributes the fatal result to rupture of an abscess of the kidney, or of the ureter. Schütze mentions three cases as fatal, without operation, though it is not clear that the deaths were really due to the kidney. Newman also calls attention to intermittent hydro-nephrosis as a result in four cases of the 21 observed by him, while in 5 albuminuria was present, and in 3 jaundice. Köhler (*Charité Annalen* xiv, Jahrgang 1889, 593) and Hahn (see table case 59) and Guyon (case 78) report three cases of hydro-nephrosis, and Thornton (*Surgery of the Kidneys*) a case of double hydro-nephrosis from the same cause. Not long since (*Med. News*, May 3, 1890) I was obliged to perform nephrectomy for hydro-nephrosis arising from movable kidney. Thornton (*loc. cit.* p. 11) and Newman (*Sur. Kidneys*, pp. 48-51) state also that torsion of the ureter may give rise to uræmia.

*Diagnosis.*—The diagnosis of movable or floating kidney is in general pretty easily made, but the disorder not uncommonly escapes attention, at least for a time, because the condition is not sought for.

Given a movable tumor in the flank, which can be displaced into the iliac fossa or up to, or even beyond, the middle line; which can be pushed back into the position of the kidney; and which has about the shape and size of a kidney; and the diagnosis is clear. Tumors of the omentum, or of the mesentery

are the most likely to be confounded with it. One very remarkable case is mentioned by Mr. Morris in his *Treatise on the Surgical Diseases of the Kidney*, p. 35.

In the appended table there are two cases (Nos. 48 and 99) in which a distended gall-bladder was present, as well as a movable kidney. In Mears' case (99) cholecystotomy was done by the lumbar incision, and in von Tischendorf's (48) the same operation (by which incision is not stated).

Mr. Lawson Tait has also reported a case of distended gall-bladder which had been mistaken for floating kidney by several distinguished authorities. (*Brit. Med. Jour.*, November 18, 1882). Dr. Lindsey Stevens has also recorded a case of floating kidney with distended gall-bladder and calculi.

Percussion of the loin will sometimes assist, although this is not to be implicitly relied upon. At best, the limits of the renal dulness are not any too well defined when the kidney is in place; and the tympanitic sound discovered when the kidney has fallen forward or downward, is not so clearly marked as to render it a thoroughly reliable symptom. The resistance to bi-manual examination afforded by the presence of the kidney, and the absence of this resistance when the kidney is displaced, is a much more reliable symptom. The bi-manual examination is best made if the abdominal hand takes advantage of expiration to depress the abdominal wall, retains the advantage so gained during the next inspiration, and follows it up by still further depression during the following expiration. The legs should be flexed to relax the abdominal wall.

The size and shape of the tumor is a reasonable guide and sometimes, though not frequently, the hilum can be made out, and pulsation of the renal artery felt.

Of course an examination of the uterus and ovaries should be made, so as to determine any possible connection of such abdominal tumor with the generative organs. That this is no needless precaution is seen from the statement of McCosh, that in two cases dilatation of the uterine canal and removal of the ovaries had been done.

The urine is generally normal, though not uncommonly it

may contain albumin. If the albuminuria is persistent, it is generally due to other causes.

*Treatment.*—The treatment of movable kidney may be threefold.

1. *By a bandage and pad.*—In not a few cases this will answer, and should always, if possible, be tried before any operative procedures are undertaken. Of the various pads devised, the inflatable rubber one of Dunning (*West. Med. Rep.*, October, 1888) and of Newman seem to me the best, though I have had no personal experience in their use. Repeated pregnancies have been known to fix the kidney, probably as a result of pressure. Simple recumbency, as advocated by Landau, can scarcely commend itself to any but those of a more hopeful temperament than the majority of either patients or surgeons.

2. *Nephrectomy.*—In a few cases this is certainly justifiable, as, for example, when the kidney cannot be forced back into its proper position, as in Polk's well-known case, where the kidney occupied the iliac region and, though freely movable, could not be pushed from the iliac fossa into the loin. Unfortunately this was the only kidney the patient had, yet she lived 11 days without secreting any urine whatever.

Again, it is a justifiable operation when the kidney is diseased as well as movable, but this is rather because of the disease than of the mobility.

Again, it is justifiable in certain cases where nephrorrhaphy has failed, and where the symptoms are of sufficient gravity to render so serious an operation as nephrectomy allowable. But in such cases it would be far better, as has been done by a number of operators (see table), that nephrorrhaphy should be repeated before nephrectomy should be considered, as the mortality from nephrectomy for movable kidney is large. Thus, Newman tabulates 30 nephrectomies for movable kidney, with 9 deaths—a mortality of 30%; while Lindner (*Wanderniere der Frauen*, p. 45) gives 9 deaths in 36 cases of nephrectomy, a mortality of 25%. The mortality from nephrorrhaphy, even though repeated, is only about 3%. Certainly then, any conservative surgeon should be unwilling to have his patient run the risk of an operation, the danger of

which is not less than 25 %, until after a trial, or even repeated trials, of the less dangerous operation have been made.

*Nephrorrhaphy*.—Greig Smith (Abdominal Surgery, 2d Ed., Phila., 1888, p. 496) says "that an unknown surgeon is said to have performed nephrorrhaphy prior to 1870, in Mobile, Ala." Careful inquiry has convinced me that this is an error, and that the credit properly belongs to Hahn, who published his paper in the *Centralblatt f. Chir.*, 1881, p. 449, though Newman states that he himself suggested it in 1880. I have, however, included in the table the case of Dowell, of New Orleans, who fixed the kidney by a tape suture 1874.

The operative procedure is first the usual one to expose the kidney. The patient is laid upon the sound side, and an oblique incision is made between the last rib and the crest of the ilium, beginning over the outer border of the quadratus lumborum. Rarely, if ever, will a rib have to be resected to gain room. The edge of the muscle being recognized, the perinephric fat is found immediately at its outer border. This fat having been cut or torn through, the kidney may be seen at once. If it is a movable kidney, as in the last case reported in this paper, but not displaced too far from its normal position, the movement will be seen to be synchronous with the respiration, and may be very wide in extent. In that case the kidney moved up and down with each respiration quite as freely as the liver ordinarily does. But if the kidney be far away from its normal position it will not be seen when the perinephric fat is torn through, but must be sought for, not only by the finger in the wound, but also either by the hand of the operator, or of an assistant, on the anterior abdominal wall, in order to push the kidney back toward its normal place.

At this stage of the operation, in order not needlessly to invade the peritoneal cavity, it is very important to be able to distinguish between the liver and the kidney, either of which may present itself opposite the wound. The perineum may be opened either intentionally or by accident. Thus Smith deliberately opened the peritoneum to determine whether the tumor was ovarian or renal in origin. Hahn accidentally opened the peritoneum, which he immediately closed by suture; and Rosenberger and Küster met with the same accident

without any ill results; while in case No. 2, reported in this paper, the same accident happened to myself. At the bottom of the wound a firm, hard, movable body was perceived, which I had every reason to believe was a kidney; but on tearing through the tissue immediately at the bottom of the wound, I found that it was not the capsule of the kidney that I had torn, as I thought, but the peritoneum, and that the firm body was the liver. Further search disclosed the fact that the kidney, which an assistant believed he was pushing back in the loin, had escaped his grasp, and was lying back in the iliac fossa. As I believed he was pushing the kidney back into the loin, I was, naturally, misled into opening the peritoneum. The opening was not large, and when the kidney was drawn up in its place it closed the opening so completely that I did not think it necessary to suture the peritoneum, nor did any ill results follow.

To avoid a similar accident in the future, however, I would suggest that in every case after tearing through the fat, so soon as the operator reaches a firm organ, which he believes may be the kidney, he should first observe its color. If it be the liver, this would be a dark brown, if the kidney, a lighter blue black. Next he should sweep his finger toward its upper border. If it be the kidney, he will very readily be able to discover the upper border by the touch; but if it be the liver, the upper border would be within the peritoneum, and beyond reach; and the comparative size of the two organs would enable him to differentiate them very quickly. The finger would readily pass below the lower border of each without giving the same differentiation. Both organs, when nephrorrhaphy is demanded, are movable, and therefore the effect of respiration would not enable us to distinguish them, as it would if we were dealing with a normal fixed kidney and a movable liver.

I think it also desirable that no attempt should be made by an assistant to replace the kidney by pressure through the abdominal wall until after the peri-nephric fat has been torn through. Any firm organ met with at the bottom of the wound, before the kidney is pushed back into its place, would probably be the liver rather than the kidney, if the movable

kidney is allowed to fall away from its normal position in the loin.

In doing the operation it is customary and desirable to place a pad or pillow under the patient, in order to widen the space between the twelfth rib and the crest of the ilium. But care should be taken that this pad is not so placed as to press the liver down opposite the opening in the loin, and so promote the very accident of which I have just been speaking.

In two cases I have found it difficult to push the kidney back opposite to the incision, but have succeeded in getting hold of the kidney by the following manœuvre: An assistant steadied the kidney, which I could just touch by the tip of my finger in the iliac fossa. I then passed a tenaculum along my finger as a guide, and harpooned the kidney by it, and drew it up to the opening. I then seized it anew with a volsella. In two cases of nephrorrhaphy and in one exploratory operation, the amount of traction by the volsella was such that the kidney substance was torn, but I never saw any ill results from it, not even any blood in the urine.

The kidney being now held in place, four methods have been used for its fixation:

As is summarized in an excellent paper by McCosh. (*N. Y. Med. Jour.*, March 15, 1890, p. 281):

1. The sutures may be passed through the adipose capsule alone.
2. They may be passed through the fibrous capsule of the kidney itself.
3. They may be passed through the parenchyma of the kidney.
4. The fibrous capsule may be stripped off the kidney, in order to obtain a raw surface of renal tissue, by means of which the adhesions, it is believed, would be firmer. The sutures are then passed through the parenchyma and capsule just inside the border of the raw surface.

In his first operation in 1881, Hahn passed the sutures through the fatty capsule only. (*loc. cit.*)

Dunning, basing his conclusion upon observations on the lower animals and in man, urges that this should be the method employed, because the attachments of the adipose capsule

are more intimate than generally supposed, and because, though intimate, they allow a normal, slight, but important respiratory movement of the kidney. If the fatty capsule alone is sutured, this normal movement is retained.

Experience has shown, however, that this means of fixation is less efficient than the third and fourth methods. In 15 cases so treated, there was failure in 4, improvement in 2, and a cure in 9 (60%).

The next step taken by Hahn, in 1881, was to pass the stitches through the fibrous capsule of the kidney itself, and this gave as a result in 27 cases, 15 cures (55.5%), improved 4, failure in 7, death in 1. But the percentage of failures was still such as to lead surgeons to seek for a still better method. The innocuousness of the operation was so assured, that greater boldness led to the third step, viz: passing the stitches not only through the capsule, but through the parenchyma of the kidney itself, first done by Delh  s in 1882 (*Verhand. XI Deutsch. Chir. Congress*, 1882). Naturally, the question would arise, to what extent the kidney would resent such traumatism: but it has been found by a large number of cases, that the presence of such sutures in the kidney substance does no harm, a fact which has been clearly demonstrated by the experiments of Bassini (*Annal. Univ. di Med. e Chir.*, Milan, 1882, p. 281), Vanneufville (*Nephrorrhaphie*, Lille, 1888), and Tuffier (*Etudes exp. sur la Chir. du Rein*, Paris, 1889).

Occasionally blood has been found in the urine, but so far as my personal experience goes, it is rare. A temporary albuminuria is much more common, but it usually yields to the ordinary treatment. Experience in man therefore confirms experiment upon animals. This method has given in 59 cases 39 cures (66+%), improvement in 11, failure in 8, and 1 death.

In 1887 Lloyd (case 70) operated by a fourth method. He split the capsule and stripped it back a certain distance, so that cicatricial tissue might attach the raw kidney substance directly to the surrounding tissues, and Tuffier (*loc. cit.*) has found experimentally that such adhesions are firmer than when the smooth unbroken capsule is relied upon. The stitches, in order better to hold the kidney, should be passed through the portion of the kidney still covered with its capsule, in order to

have the advantage of its greater strength, lest they should tear out.

Five cases (Nos. 70, 90, 97, 103 and 116, 1 cured, 2 improved, 1 result doubtful, 1 failure) have been operated upon by this method. The number of cases is, as yet, insufficient to form a judgment as to its merits, but so far it is not encouraging. I have had no personal experience with it, and so far I have had good reason to be entirely satisfied with the third method, which I have adopted in all the four cases that I have operated upon. Moreover, of all these methods, we must remember that experience as yet is limited. It is certainly true that for a comparatively long time, the kidney has seemed to tolerate the presence of sutures in its substance without harm; but whether this will continue for years, whether such sutures will be a source of trouble when the degenerative changes of old age take place, whether their apparent innocuousness will give place to serious disease when the general health fails from any severe intercurrent malady, still remains to be seen.

The place where it shall be anchored should correspond nearly to the normal physiological position, but it will probably always be a little further down. If the conclusions of Dunning are correct, as I believe they are, its displacement to the lowest limits of its normal respiratory average would seem to be desirable, so as to relieve it from undue diaphragmatic pressure. Certainly I should be opposed to the method of Ceccherelli and some others of his countrymen, who have resected the twelfth, and even the eleventh rib, in order both to get more room for the operation, and to put the kidney as nearly as possible in its physiological position. The slender advantage of such a resection is certainly outweighed, in my opinion, by the great additional danger, and I should regard it as bad surgery to attempt it again. One of the four deaths that have occurred was distinctly due to wounding the pleura by this method. Stitching the kidney to the aponeurosis will hold the kidney sufficiently well and obviate any necessity for fastening it to the ribs, as was done by Duret (*Bull. Acad. Roy. de Belg.*, 1888, p. 440), and Tuffier (*loc. cit.*).

Whatever method is adopted, it is plain, as Frank has pointed out, that both extremities of the kidney should be

fixed in order that it may not be pendent from one extremity only, and thus be liable to torsion and other movements. I have ordinarily passed six sutures, one at the upper end and one at the lower end, through both lips of the wound, penetrating through the kidney substance en route. Two other stitches I have usually passed between one lip of the wound and the anterior part of the kidney. A curved Hagedorn needle in Abbe's needle holder I have found to be best. The stitches should always pass through the muscular aponeurosis at the edges of the incision, in order to get a firm hold.

The question of the material for the sutures is an important one. Catgut, which was used in the earlier operations, is, I think, an improper material, and to it was due many of the early failures. Wire would certainly not answer. Gould and Morris have used kangaroo tendon successfully. Either this or silk-worm gut, or aseptic boiled silk is the best, and personally, I prefer the silk. I have used it in all my own cases and it has answered admirably.

Again, the question has arisen whether the sutures shall remain temporarily in place, or whether they shall be left permanently. I have little doubt as to the desirability of leaving them permanently, but in doing so we must remember the large number of silk ligatures that have given rise to subsequent trouble, especially in abdominal surgery. In two cases in this table (46, 53) the sutures were subsequently discharged. Hence, it is important, I think, that the silk should be as fine as possible, but thick enough to be strong.

To secure stronger adhesions Thornton (*loc. cit.*) advises that the areolar tissue be stirred up, and several drainage tubes be introduced, but I believe that the latter procedure at least is needless.

The kidney having now been fixed in place, what shall be done with the wound? Personally, I was at first disposed to close it and drain, but even the slight experience I have had leads me to believe that the best plan is to leave it open, and dress it with ordinary bichloride or double cyanide gauze. Within 24 hours I have always found that the wound, large as it seemed at the time of the operation, has been almost entirely closed by the bulging of the soft parts below the skin, and

that there has only been a superficial wound which would cicatrize in the course of ten days or two weeks. Immediate closure by buried catgut sutures to unite the muscular layers, and superficial interrupted sutures of silk for the skin (Senn, case No. 108) will also do well.

The open method secures the best possible drainage, and if the operation be an aseptic one, there should be scarcely any rise in temperature and but little discomfort.

One source of discomfort, however, I have found very marked in two cases, and Weir has alluded to the same trouble. The incision crossed the path of the ilio-hypogastric nerve, and, in the cases alluded to, the patients complained of a great deal of pain in the hip and groin of the corresponding side, which I presume was due to injury of this nerve. As the nerve is entirely one of sensation, if I again find it in my path and exposed to probable injury, I should divide and exsect two or three inches of the nerve. The local anæsthesia that would follow, I believe is of no importance, but the pain, which sometimes follows, is a serious inconvenience to those in whom it has existed.

*After Treatment.*—The after treatment of the wound itself is very simple, and need not vary from that which is ordinarily used for other such wounds. A more important matter is the question of recumbency after the operation, in order that the adhesions shall become firm, and not be in danger of giving way. The patient should not be allowed to sit up until at least four weeks have elapsed from the time of operation. This, I think, is ample time for the formation of reliable adhesions; but too many cases have suffered from relapse not to put the careful surgeon on his guard against the possibility of the yielding of these adhesions.

Should a relapse occur, a second nephrorrhaphy, and, if need be, even a third should be done before the question of nephrectomy is raised, unless there be some disease of the kidney, which would render its extirpation justifiable. Subsequent nephrectomy was done in four cases (1, 25, 66, 85).

When the patient begins to go about, a snug-fitting elastic bandage, with or without a pad, should be worn for several months, and possibly longer, so as to support the kidney in its

new position; and the patient should be on her guard against lifting heavy weights, jumping, running, dancing, gymnastics, or other violent exercise, for a year or two after the operation, lest the same violence which may have produced the difficulty should reproduce it.

*Ultimate Results.*—Finally, we may consider the question of the definite results achieved by the operation. Four deaths have occurred in 134 operations. On analyzing these fatal cases we find that one (No. 21) as has already been stated, was due to imprudent surgery (Ceccherelli's case), by fastening the stitches around the twelfth rib. (In one of Hahn's cases suppuration of the wound was followed by purulent pleurisy, recovery, however, following after appropriate treatment.) A second case, Hahn's (No. 83), was not due to the operation, but to an unrelieved ileus. Death occurred in two days.

A third death, that of Langenbuch (No. 107), was due to an accident, as one of the stitches passed through an old embolic infarct of the kidney, which caused death from septicæmia in three days.

The fourth death, that of Mr. Tait (No. 36, 37, or 38), was due to suppuration, presumably a result of the operation. But suppuration will be a rare complication if the operation be done aseptically.

The mortality of the operation, therefore, *per se*, is at worst only about 2 or 3 per cent, which renders it one of the least dangerous operations of surgery. When we consider the serious symptoms, the frequently severe pain or, at least, long continued discomfort, incapacitating the patient for the ordinary avocations of life, and not seldom resulting in hysteria, hypochondriasis, and even melancholia, it would seem that relief is purchased by but very slight risk. Moreover, as I have pointed out, the danger from hydronephrosis, if nothing be done, is very serious, and probably even greater than that of the operation itself.

Comparing this with nephrectomy, which has given a mortality of from 25 to 30 per cent, it would seem very evident that no conscientious surgeon should recommend nephrectomy for a mobile kidney, until nephrorrhaphy has been given a fair and thorough trial.

I append to this paper a table of all the cases that have been recorded up to the present time in surgical literature, so far as I have been able to find them, and to them have been added a few cases, for which I am indebted to the courtesy of Mr. Henry Morris, of London, and other friends, with three of my own cases, not before published.

The table has been prepared with great care by Dr. Thompson S. Westcott, to whom I desire to express my hearty thanks. Just after it was completed, Dr. A. J. McCosh's excellent paper appeared. I should not have published Dr. Westcott's table, but that it contains a considerable number of additional cases, and covers a somewhat larger field. It also corrects some minor errors in Dr. McCosh's paper. For example, in quoting my first case of nephrorrhaphy (No. 74 of his table) he states that the sutures were passed through the capsule only; whereas, they were passed through the parenchyma as well as through its capsule. And in Hahn's 20 cases, reported by Frank, McCosh has unintentionally introduced a new operation in surgery, that of auto-nephrorrhaphy, by giving the name of the patient as the operator—a correction which I am sure Dr. McCosh will be kind enough to accept.

## SYNOPSIS OF 134 OPERATIONS FOR NEPHRORHAPHY.

No.	Date.	Operator and Reference.	Age, Sex, Side.	Symptoms.	Operation.	Ligature.	Result.	Remarks.
1	Aug., 1874.	Dowell.—N. O. Med. & Surg. Jour., Aug., 1879.	30. F. R.	Pain in right side.	Seton for 3 months through abdominal wall and kidney.	Tape seton.	I.	Repeated a year after with less relief. Became insane for two years. Subsequent nephrectomy by Dr. A. W. Smyth. Cured. Kidney found scarred from seton.
2	April 10, '81.	Hahn.—Berlin. Klin. Woch., 1889, p. 229. (vide Frank).	29. F. R. & L.	Pains in belly and legs. Two years bedridden. Gynaecological operation without success. Both kidneys moveable.	Stitched, unopened fatty capsule of right side. Six to eight sutures.	Catgut.	Failure.	Pains soon returned and kidney found again moveable.
3	Nov. 5, '81.	"	29. F. R.		Stitched capsule proper.	"	I.	
4	Dec. 20, '81.	"	29. F. L.		"	"	N. I.	Followed by pleurisy and empyema left side. May, 1884, plastic operation for hernia of kidney [which?] Chronic pneumonia. Hypertrophy.
5	April 14, '81.	"	38. F. R.	Violent oppression; severe pain in whole abdomen; often became unconscious, often bedridden, unable to work.	Stitched, unopened fatty capsule. Six to eight sutures.	"	Failure.	Pains returned in several weeks with inactivity, for which did Op. 6.
6	Sept. 22, '81.	"	"		Stitched capsule proper.	"	C.	Subsequent history unknown.
7	Oct. 26, '81.	"	35. F. R.	?	"	"	C.	Well December, 1888.
8	Oct. 26, '81.	Deinac.—Supp. to Centbl. f. Chirg., 1882, No. 29.	? F. R.	?	Stitched through kidney substance.	"	I.	
9	'82.	Küster.—Supp. to Centbl. f. Chirg., 1882, No. 29.	?	?	Opened fatty capsule.	"	I.	Fixed after a month.
10	'82.	Esmarch.—Supp. to Centbl. f. Chirg., 1889, No. 29.	?	?	"	"	C.	Fixed after a month.
11	'82.	Luenstein.—Supp. to Centbl. f. Chirg., 1889, No. 29.	?	?	Stitched capsule, fatty (?)	?	N. I.	Fixed after several months. Pains still great.

12	July 27, '82.	Basini.—Centblt. f. Chirg., 1883, 4, p. 63. From Annal. Univ. di Med. e Chir. Milano, Sept. 1882, pp. 281-286.	27. F.R.	Three years standing. Gastric symptoms and pain.	Capsule opened and stitched to 12th rib. 4 sutures.	Catgut.	C.
3	Dec., '82.	Weir.—N. Y. Med. Jour., 1883. Feb. 17.	33. F.R.	Traumatic, five years standing. Pain radiating to thigh and shoulder. Tender tumor. Occasional hæmaturia and metorrhagia. Repeated vomiting and nausea. Very severe pain for two years. Kidney very moveable.	Redundant fat removed and edges stitched to wound. Six or 8 sutures.	Carbolized Catgut.	C.
14	Jan. 10, '83.	Küster.—Lindner.—Ueber die Wanderniere der Frauen Berlin, 1888.	27. F.R.	?	Stitched, opened capsule and superficial substance.	Catgut & silk.	C.
15	Jan. 26, '83.	Hahn.—Loc. cit.	32. F.R.	?	Stitched capsule proper.	Catgut.	C
16	March 29, '83.	Newman.—Br. Med. Jour., April 28, 1883, p. 831.	40. F.R.	Severe vomiting, anoxæmia, diarrhoea. Pain in renal regions increased at menses.	Adipose capsule incised and sewed to wound eight sutures. 2 sutures through cortex & parietes secured by buttons externally.	Chronic catgut	C.
17	April 4, '83.	Svensson.—Centblt. f. Chir., 1886, 47, p. 824.	31. F.R.	Constant pain. Incapable of slightest work.	Fourteen stitches through substance	Silk.	C.
18	May, '83.	Grieg Smith.—Lancet, London, 1884, ii, 10.	39. F.R.	Tumor. Pain, mental depression, dyspepsia.	Abdominal incision. Tried to stitch subcutaneously. Substanced tore. Scratched surface and left.	None.	N. I.
19	Oct. 15, '83.	Küster.—Loc. cit.	35. F.R. & L.	Probably traumatic. Pains, marasmus. Both kidneys very moveable.	Synchronous operations. Stitches through substance	Silk and Tem. I.	
20	Feb. 2, '84.	"	52. F.R.	Probably traumatic. 13 children. Pain for 4 months. Very moveable.	Peritoneum accidentally opened. Stitches through substance.	Silk and catgut.	C.
21	Feb. 11, '84.	Ceccherelli.—Centblt. f. Chir., 1883, 44, p. 745. Riv. clin. di Bologna, 1884, 3, S., iv, 289-316.	38. F.L.	Severe distress for years.	Stitches carried around the 12th rib.	Catgut.	D.
22	Aug. 4, '84.	Hahn.—Loc. cit.	48. F.L.	Pain, vomiting, unable to work.	Stitched capsule proper.	Silk. (?)	C.

45 hours after operation. Atelectasis and pleural effusion of left chest.

After 4½ years. A previous ovariectomy in 1881.

TABLE.—CONTINUED.

No.	Date.	Age, Sex, Side.	Operator and Reference.	Symptoms.	Operation.	Ligature.	Result.	Remarks.
23	Aug. 28, '84.	52. F. R.	Hahn.—Loc. cit.	Not given.	Stitched capsule proper at upper end.	Silk.	Tem. I.	Return of pains in 6 months.
24	June 12, '85.	"	"	Return of symptoms.	Stitched capsule proper.	"	I.	Renewed pains from hernia of kidney. Operation. General condition improved.
25	Oct. 10, '84.	32. M. R.	Agnew.—Phil. Med. Times, June 13, 1885.	Seven years duration from strain. Constant pain.	Perineal fat & capsule sutured to edges of wound.	Catgut.	Failure.	Returned in 10 weeks after unusual exertion. Subsequent nephrectomy.
26	Oct. 30, '84.	44. F. R.	Dunning.—Jour. Amer. Med. Assoc., Chicago, 1885, iv, 169-201.	Strain 7 years before. Three years bedridden. Improvement followed by crisis of 9 weeks.	Stitches each side and adipose tissue. Separate stitches also.	"	I.	Kidney moveable one inch laterally.
27	Nov. 13, '84.	27. F. R.	Braun.—Correspblt. d. Aerztever. f. Thüringen, 1885.	Severe pain in renal region.	Stitches through fatty capsule and substance.	Silk.	C.	After a year.
28	Dec. 4, '84.	45. F. R.	Gardner.—Aust. Med. Jour., 1885, N. S., vii, p. 153.	Severe pains under right ribs and right scapula. Mother of 14 children.	2 stitches through opened capsule & 2 through substance 2 inches apart.	Chromic Kangaroo tendon.	C.	Recovery retarded by burrowing abscess.
29	July 24, '85.	35. F. ?	Braun.—Loc. cit.	Not given.	Peritoneum opened.	?	R.	Reported very soon after operation.
30	Aug. 25, '85.	41. F. R.	Rinne.—Schwerdtfeger, inaug. Diss. Greifswald, 1886.	Associated with spinal disease. Constipation, gripping pain at micturition, irregular menses. Disturbance of sensation and motion of legs, nausea, vomiting.	7 stitches through adipose capsule & kidney.	Catgut.	I.	Kidney fast after 6 months. Bedridden from spinal disease.
31	Oct. 10, '85.	35. F. R.	Dunning.—Journ. Am. Med. Assoc., Dec. 9, 1885.	Not given.	Stitches through fatty capsule.	"	I.	Marked relief. Lateral movement of 1/2 inch. Permanent 3 years after.
32	Dec. 18, '85.	51. F. R.	Hahn.—Loc. cit.	Severe pain in back since menopause a year before. Obstinate constipation, pain radiating from kidney. Spinal sclerosis.	Stitched capsule proper.	Silk.	N. I.	Symptoms largely due to spinal disease.

33	Dec., '85.	30. F. R.	DePaoli.—Centblt. f. Chir., 1885, 51, p. 910. Gaz. de Clin. L'orino., 1885, xxii, p. 108 (Warfringe)	Lumbar pain, increasing digestive disturbance, bed unendurable, walking soon followed by pain and vomiting.	12th rib resected to gain room. Numerous stitches through fat and capsule to edges of wound.	C.
34	1885.	? ? R.	Svensson.—Schmidt's Jahrb., 1885, 205, p. 108 (Warfringe.)	Not given.	Fastened to edges. Silk. wound by ligature through kidney.	C.
35	1883. (?)	38. M. R.	Dodd.—Lancet, Jan. 11, 1890, p. 68.	Aching pains in lumbar region and abdomen, dyspepsia, mental depression.	Not given	I.
36	Feb. 3, '86.	45. F. ?	Lawson Tait.—Br. Med. Jr., Nov. 16, 1889.	Not given.	Not detailed.	N. I.
37	March 8, '86.	32. F. ?	"	"	"	N. I.
38	Nov. 22, '86.	23. F. ?	"	"	"	D.
39	March 30, '86.	41. F. R.	Morris.—Annals of Surgery, April, 1887.	Occasional pain since 14 years. Severe dragging pain for 6 months. Tender tumor. Increased frequent micturition.	Suture through skin and subcutaneous tissue, capsule and parenchyma of upper and posterior surface.	C.
40	April 28, '86.	42. F. R.	Lauenstein.—Deutsch. Med. Wochenschrift, 1887, p. 568.	Continued pain in back, especially between shoulders and neck dragging on right side, stiffness of back, although weak. Weakness legs. Nausea. Impossible to sit or stand long. Uncontrollable vomiting. Loss of strength. Two years after severe bronchitis. Intolerable pain, intestinal symptoms.	5 sutures through muscles and substance kidney.	C.
41	May 27, '86.	34. F. R.	Küster.—Loc. cit.	Stitches through substance.	Silk and catgut.	T. I.
42	May 27, '86.	20. M. L.	Ghinozzi.—Raccogliore Med Forl., 1886, v. ii, 173-191.	Two years after severe bronchitis. Intolerable pain, intestinal symptoms.	Stitched capsule to 12th rib.	C.
43	June 30, '86.	56. F. ?	Morris.—Loc. cit.	Pain in loins and sickness while standing, but ceased in recumbent position.	Two gut sutures through muscle, fascia and capsule, two silk sutures through thickness wound, and kidney substance.	C.

One of Mr. Tait's cases, 36, 47, or 38, died long after leaving his care, as he thinks, from suppurative induced by the operation.

" " "

At end of 8 months.

Recovery retarded by right pleurisy. Permanent at end of 9 months.

Recurred at end of 1886.

Commends importance and success of attachment to 12th rib.

Firmly fixed and cured permanently after 5 months.

TABLE.—CONTINUED.

No.	Date.	Age, Sex, Side.	Operator and Reference.	Symptoms.	Operation.	Ligature.	Result.	Remarks.
44	July, '86.	? F.R.	Dunning.—West. Med. Reporter, 1888.	Frequent attacks of intense pain, dragging sensation, persistent vomiting.	Stitched, moveable perirenal cellular adipose tissue to edges of incision.	Silk and catgut.	C.	After two years.
45	Aug. 4, '86.	26. F.R.	Küster.—Loc. cit	Pain for 5 years, especially while walking. Dysmenorrhœa, gynaecological complaints.	Stitched through substance.	Catgut.	N. I.	Cured by subsequent gynaecology. Op. Sept., 1886.
46	Oct. 2, '86.	34. F.R.	Stonham.—Lancet, 1888, ii, 109.	Cramps, pain in movement, incapacity for work.	Sutures through deep structures of wound and perinephric fat and capsule.	Silk.	C.	Abscess 3 months after in cicatrix, with discharge of deep silk suture. Permanent relief 6 months after.
47	Autumn, '86.	35. F.R.	Hahn.—Loc. cit.	Not given.	Stitched capsule perirenal.	"	C.	After 3 years.
48	1886.	? F.R.	Von Tischendorf.—Sitzungsber. der Chir. Cong. Allem, 1887.	"	Done during an operation (abdominal?) for gallstones.	Not given	C.	Freed from pain.
49	Jan. 23, '87.	25. F.R.	Morris.—Personal communication.		Fibro-fatty capsule drawn up into wound, cut short and stitched to edges of wound by four sutures. Wound granulated.	Catgut & silk.	C.	Some subsequent loosening. Organ easily and painlessly retained by pad and belt. Leads a very active life.
50	Feb. 15, '87.	85. F.R.	Turgard.—Bul. Med. du Nord. Lille., 1887, xxvi, 334.	Traumatic 4 years. Menstrual disturbance, increased after 2 years. Sudden recurrence. Bedridden at menses, bilious vomiting, great pain in loin.	Stitched, unopened fatty capsule.	Carbolized silk	Tem. I.	Return after ten weeks. Two menstr. epochs after operation free from pain.
-	April 7, '87.	40. F.R.	Morris.—Personal communication.	Not given.	Same as Case 49.	Catgut & silk.	C.	

52	April 22, '87.	46. F. R. Hahn.—Loc. cit.	Fall October, 1886 Then severe pains back and right leg. Obstinate constipation, epigastric pain. Morphia habit.	Stitched capsule proper.	Silk.	C.	Laparotomy February, 1887, for supposed carcinoma of intestine. Scybala. Wandering kidney found after convalescence. Permanent after a year. One of silk sutures discharged by abscess.
53	May 6, '87.	33. F. R. Duret.—Bul. Acad. Belg., 1888, v, p. 440.	Seven months duration. Gas-tralgia, diarrhoea, constant pain right renal region preventing standing and working. Menstrual crisis. Marasmus.	Resection 12th rib. Fatty capsule fixed with 6 sutures to wound. 7 sutures through capsule and kidney to periosteum 11th and 12th ribs. 3 sutures through posterior surface, kidney $\frac{1}{2}$ inch deep, a few gut sutures in wound.	"	C.	
54	May 11, '87.	47. F. L. Morris.—Loc. cit. Brit. Med. Jour., Nov. 16, 1889.	Not given.	Same as Op. 53.	Kangaroo silk.	C.	After 7 months.
55	June 14, '87.	39. F. ? Duret.—Loc. cit.	Neurotic family history. Gas-tralgia 9 years. Violent abdominal pain with syncope of increasing frequency.	Same as Op. 53.	Silk.	I.	Crises less severe and kidney nearly immoveable. May be atony.
56	June, '87.	24. F. R. Willcox.—Annals of Surgery, 1888, vii, p. 192.	Nine years duration. Pain and dragging in tumor.	3 sutures through fatty capsule and lips of wound. Loose coaptation.	Heavy catgut.	C.	
57	Sept. 22, '87.	36. F. R. Richardson.—Bost. Med. Jour. June 13, 1888.	Intense pain with movement of tumor. Unable to work.	4 stitches through capsule only.	Silk.	C.	Sutures removed 15th day. Permanent at present time.
58	Oct. 6, '87.	22. F. L. Kummell.—Ber. Klin. Woch., 1885, p. 34.	Epigastric pain.	Not given.	Not given	I.	Previous recovery. Nephrectomy, June, 1887, by Wiesinger. Numerous small calculi passed from dislocated left kidney subsequent to operation. Excised kidney healthy. Gained 4r lbs. Occasional intermittent hydronephrosis.
59	Oct. 11, '87.	31. F. R. Hahn.—Loc. cit.	Fall a year before followed by dragging in right renal region. Constipation. Morphia habit. Not given.	Stitched capsule proper. Peritoneum wounded.	Silk.	C.	
60	Oct. 12, '87.	36. F. L. Morris.—Personal communication.	Not given.	Same as Op. 54.	Kangaroo tendon.	C.	
61	Nov. 12, '87.	23. F. R. Hahn.—Loc. cit.	After dancing. Severe pain, confined to bed, vomiting, icterus. Not given.	Stitched capsule proper.	Silk.	C.	Stomach symptoms occasionally recur. Able to work.
62	Dec. 7, '87.	47. F. R. Morris.—Loc. cit.	Not given.	Same as Op. 54.	Kangaroo silk.	C.	Left kidney fastened May 11, 1887. So much relieved that she returned to have right operated upon.

TABLE.—CONTINUED.

No.	Date.	Operator and Reference.	Age, Sex, Side.	Symptoms.	Operation.	Ligature.	Result.	Remarks.
63		Kimmel.—Sitzungsber. d. Artz. Ver. Hamburg, 1, 25, 1887 and 8, 28, 1887.		Not given.	Stitched capsule.	Not given	Tem. 1.	Return with less suffering af- ter 6 months.
64		"		"	Stitched kidney sub- stance.	"	C.	After 1½ years.
65		"		"	"	"	C.	Fast after 1¼ years. Hys- terical manifestations.
66		"	60. F. R.	One year severe pain. Opium habit.	Stitched capsule.	"	N. I.	Kidney remained fast but suf- fering returned after one month. Subsequent suc- cessful nephrectomy.
67		Schede.	? F. ?	Not given.	Not given.	"	C.	Patient rides much.
68		"	"	"	"	"	N. I.	Is hysterical. Doubtful if pains due to moveable kid- ney.
69 70		Lloyd.—Practitioner, Sept., 1887; Centbl. f. Chir., 1888, No. 3.	"	"	"	"	I. C.	Reported soon after.
71	Feb. 5, '88.	Langenbuch.—Deut. Med. Woch., 1889, p. 385	19. F. R.	Pains in right loin.	Stripped off capsule from surface one inch diameter & fixed denuded cor- tex by 2 deep su- tures to wound.	Stout cat- gut	C.	Also moveable liver subse- quently operated upon.
72	April 8, '88.	Guyon.—Bul. de l'Acad. de Med., Paris, 1889, xxi, 239- 250.	54. F. R.	Pains in right loin since child- hood. Dragging often cut- ting pain right side extend- ing to pelvis. Sometimes con- tinues for weeks. Increased by exertion and menses.	Four strong sutures through capsule and superficial substance.	Catgut.	C.	Gained 12 pounds in year.
73	April 25, '88.	McCosh.—N. Y. Med. Jour., March 15, 1860.	28. F. R.	Three years. Paroxysmal pains radiating to iliac fossa, thigh and perineum. Also fixed pain. Lying in bed, standing or walking soon painful. Unable to work.	Four double sutures, the upper fastened about 12th rib, then through mus- cular fibres, trans- fixed fascia of fat- ty capsule. One suture through substance. Deep muscular sutures.	"	C.	Permanent after 7 months.

74	May 16, '88.	Hahn.—Loc. cit.	18 F.R.	For 3 months. After strain sudden pain in right renal region. Pains in abdomen. Unable to work.	Stitched capsule Silk proper.	C.	Fast 6 months after. Is now able to work.
75	June 4, '88.	Rosenberger.—Sitzungsber. d. Phys. Med. Gesellschaft zu Würzburg, 1888, 123.	22 F.R.	Poor appetite and sleep. Continuous cramplike pains in abdomen.	Peritoneal cavity opened, Fat torn away so that capsule came in contact with peritoneum 7 sutures through substance of kidney	C.	
76	June 18, '88.	Lucas Champignière.—Jour. de Med. et de Chir. Prat., May, 1889.	31 F.R.	For 3 years. Walking or standing impossible. Severe pain on raising right arm. Unable to earn living.	Five sutures through capsule and substance of kidney Same as Op. 72.	C.	After 11 months.
77	June, '88.	McCosh.—Loc. cit.	34 F.R.	Sudden appearance of painful tumor at age of 15. Tenderness, great pain, vomiting, tumor appeared from time to time, and increasing difficulty of reduction.	Same as Op. 73.	C.	At end of six months.
78	July 5, '88.	Guyon.—Loc. cit.	20 F.R.	Three months. Frequent attacks of pain in right loin, shooting into groin and across abdomen. Increased by exertion. Sickening pain on pressure. Very painful.	2 sutures through capsule and substance and lumbar aponeur. Also deep and superficial wounds sutures	C.	Attributes the crises to an intermittent hydronephrosis due to constriction of ureter by malposition. Always followed by an abundant discharge of urine.
79	July 10, '88.	Gould.—Lancet, 1888, ii, 674.	28 F.R.	Return of above.	Sutures through substance and edges, incision. Same as Op. 80.	T. I	Returned in 3 months.
80	Previous to above.	"	R.	Not given.	Kangaroo skin.	C.	
81	"	"	R.		"	C.	
82	Previous to Op. 79.	"			"	C.	
83	Summer 1888.	Hahn.—Loc. cit.	30 F.R.	Emaciation, vomiting, constipation. Ileus.	Stitched capsule Silk proper.	D.	Two days after from unrelieved ileus.
84	Sept. 26, '88.	"	40 F.R.	Longstanding pain in abdomen.	"	I.	Recovery retarded by intestinal trouble.
85	Sept., '88.	Clarke.—Brit. Med. Jour., Nov. 16, 1889.	18 F.R.	Severe pain only bearable in recumbent position.	3 sutures through substance and peritoneal covering.	T. I.	Symptoms returned and at subsequent nephrectomy kidney found fast. A minute stone at pelvis.
86	Oct. 26, '88.	Keen.—Phila. Med. News, April 20, 1889.	35 F.R.	Following injury 18 years before. Digestive disturbances, moderate pain and constant discomfort.	7 sutures through capsule and substance.	C.	Permanent relief after 18 months.

TABLE.—CONTINUED.

No.	Date.	Operator and Reference.	Age, Sex, Side.	Symptoms.	Operation.	Ligature.	Result.	Remarks.
87	Nov. 14, '88.	Hahn.—Loc. cit.	29. F. R.	Cramps in belly, constipation.	Sutured kidney substance.	Silk.	N. I.	Dead and dumb. Symptoms indefinite, and operation experimental.
88	Nov. 17, '88.	"	35. F. R.	Fall a year before. Dragging pain right side, only bearable lying down. Much vomiting, emaciation.	"	"	C.	
89	Nov. 28, '88.	Bryant.—N. Y. Med. Rec., Jan. 12, 1889.	28 M. R.	Nervousness, debility, nausea, anorexia, diarrhoea. Seven years standing.	3 inches of fatty capsule resected on each side and edges fastened to external wound by Dissects fibrous capsule and passes suture through denuded surface of kidney.	Carbolized silk	C.	Also had fibrous constriction colon for which was done laparotomy, February, '88.
90	Dec. 4, '88.	Tuffier.—Le Cuziat. Inaug. Dissert., Paris, 1889.	38. F. ?	Traumatism, 1882. Pain at first slight increased with time. Digestive trouble. Retention urine.		Catgut.	I.	Dermoid cyst of left ovary removed February, 1889, with complete cure. Kidney fast
91	Dec. 20, '88.	Terrillon.—Bul. de l'Acad. de Med., Paris, 1889, xxi, p. 499.	42. F. L.	Four or five years. Violent and variable pains left side and renal region. Frequent syncope. Bedridden three months. Intermittent hydropnephrosis.	Sutures through capsule proper & deep structures of wound.	"	C.	
92	Dec. 20, '88.	Hume.—Lancet, Jan. 11, 1890, p. 68.	31. F. R.	Moveable tumor appearing in upright position. Aching pain. Mental depression.	Not given.	Not given	T. I.	Relapse after 6 months
93	1888.	Second.—La France Med., Sept. 21, 1889.		Not given.	"	"	C.	
94	1888.	Guermonprez.—L'Abbeille Med. 1888, 44.	37. F. ?	Suffered two years.	Sutures through kidney and capsule. Same as Op. 54.	Crin de Florence Kangaroo tendon.	C.	
95	Jan. 17, '89.	Morris.—Loc. cit. Vide Br. Med. Jour., Nov. 16, 1889.	35. F. R.	Attacks of sudden abdominal pain, and cramp of abdominal muscles.	"	"	C.	
96	March 1, '89.	Morris.—Loc. cit.	30. F. R.	Not given.	Capsule proper incised and partly dissected off, through which 2 sutures. Polar	Catgut.	C.	
97	March 4, '89.	Lucas Championnière.—Kholodenko. Thesis, Paris, 1889.	48. F. ?	Traumatism a year before. Pains in abdomen and loin, like uterine colic, occurring in crisis. Smothering sensation in dorsal decubitus. Prolonged walking or standing incises suffering.				

98	March 11, '89.	Terillon.—Annal. de. Mal. de Org., Genitourin., 1889, p. 469.	Injury 7 years before. For 2 years frequent crises of abdominal pain radiating into right back and thigh, nausea and vomiting. Digestive disturbance, painful micturition at times.	For 2 Six sutures through fatty capsule only.	Catgut.	C.	After 4 months.
99	March, '89.	Mears.—Trans. Am Surg. Assn., 1889.	Very moveable tumor, pain in right renal region, frequent micturition, blood in urine.	Capsule incised. Sutures through substance.	"	I.	Operation exploratory. Moveable kidney found and stitched, but also a gall bladder distended from impacted calculus. Stone crushed and pushed into intestine and bladder stitched below kidney in lumbar wound. Complete cure resulted.
100	April 18, '89.	Lucas Championnière.—Loc. cit., Op. 96.	For 7 years very severe pains in right flank shooting into groin. Aggravated by walking or standing.	Fatty capsule stitched with two sutures, and seven through substance.	"	I.	Complains still, but walks much better.
101	April 28, '89.	Lucas Championnière.—Loc. cit.	Not given.	7 sutures through substance.	"	I.	2 months after, notable amelioration but pain not entirely relieved.
102	June 8, '89.	Morris.—Loc. cit.	"	Same as Op. 54.	Kangaroo tendon.	C.	
103	Sept., '89.	Segond.—Loc. cit.	Two twin and two single pregnancies in 4 years. Cannot work or lie down long.	Retracts fatty capsule, and passes through denuded kidney. Method of Tuffier.	Catgut. ?	?	Not further reported.
104	Oct. 10, '89.	Keen.—Case 2, this paper.	Weak back since childhood. Fell 2 years ago, and had pain in back. Attacks of epigastric pain and vomiting, painful tumor. Intermittent albuminuria.	4 sutures through parenchyma.	Boiled silk	C.	At present time permanent.
105	Nov. 19, '89.	McCosh.—Loc. cit.	Gradually increasing since childhood, severe pain right side. Intervals of relief. Dyspepsia, nausea and vomiting.	7 sutures through capsule and cortex.	Catgut.	I.	On 21st day kidney slightly moveable. Operation repeated.
106	Dec. 10, '09.	"	"	3 sutures through substance.	Silk.	C.	After 3 months.

TABLE.—CONTINUED.

No.	Date.	Operator and Reference.	Age, Sex, Side.	Symptoms.	Operation.	Ligature.	Result.	Remarks.
107	1889.	Langenbuch. — Deut. Med. Woch., 1889, p. 325.	43. F.R.	Biliary (?) colic for 22 years. Tumor in region gall-bladder.	Sutures through substance of kidney.	Silk.	D.	Exploratory laparotomy for supposed tumor of gall bladder. Then lumbar nephro-rhaphy for the moveable kidney. On 3d day septi-cæmia from suture passed through old kidney infarct. Kidney fast, but paroxysms return as frequently as before.
108	Feb. 3, '90.	Senn. — Personal communication from patient's physician	42. F.R.	Duration over 12 years. Paroxysms of severe pain beginning in kidney and extending to stomach and right shoulder. Occasional traces of albumen in urine.	4 sutures through parenchyma.	"	N. I.	
109	Feb. 29, '90.	Keen. — Case 3, this paper.	31. F.R.	Malaise, loss of strength, pain in renal region, groins and thigh on slightest effort. Is an invalid.	Six sutures through parenchyma.	"	C.	
110	March 6, '90.	Keen. — Case 4, this paper.	25. M.R.	Two years duration. Excessively severe. Lancinating pains. Hæmaturia and albuminuria after paroxysms. Total inability to work.	Six sutures through parenchyma.	"	Probable cure	Two months after operation steadily improving in health and strength. Pains all gone.
111	May 15, '89.	Chas. B. Porter. — Personal communication.	50. F.R.	Tumor disappearing at times. "Stitches" in right side and back. Indigestion, vomiting, frequent menstruation, "fainting spells," loss of flesh.	Six sutures each in fatty and fibrous capsule.	"	C.	Permanent at present time.
112	May, '89.	McCann. — Personal communication.	34. F.R.	Pain in loins, gastric disturbance, loss of flesh.	Six sutures through parenchyma.	Silk-worm gut.	C.	
113	Oct. 8, '89.	Dennis. — Personal communication.	28. F.R.	Severe pain in right side. Dragging sensation and movement of tumor. Became bed-ridden.	Suture through parenchyma.	Not given	C.	Permanent at present time. Is now able to work.
114	Oct., '89.	"	24. P.R.	Chronic invalid for years with dyspepsia and diarrhoea. Severe pain in renal region.	Suture through parenchyma.	"	I.	Pain relieved but still suffers from intestinal trouble.

115	Nov., '89.	Parkes.—Personal communication.	37. F.R. Severe dyspepsia, emaciation, pain. Nausea when away from normal position. Albuminuria.	2 sutures through parenchyma.	Catgut.	Failure.	Opposite kidney now moveable.
116	Jan., '90.	Parkes.—Personal communication.	26. F.R. Severe dyspepsia. Emaciation. Very moveable and easily recognized tumor. Painful when out of place.	Opened capsule for 1 inch. Two sutures through edge of capsule on each side. Two sutures in long axis.	"	T. I.	Patient now says that kidney has again become moveable.
117 to 120		Clarke.—British Med. Jour., Nov. 16, 1889.				Satisfactory.	Four cases referred to incidentally.
121 to 134		Küster.—Berl. Klin. Woch., 1889. Proceedings Surg. Congress				"	Mentions 14 cases beside the 6 reported in table.

## ANALYSIS OF TABLES.

In the large table the abbreviations are as follows:

C.—Cured permanently.

I.—Improved permanently.

T. I.—Improvement lasting for a time but relapsing in a few months.

F.—Failure of fixation of kidney after a few weeks.

N. I.—Not improved by operation, but kidney remaining fast.

In the smaller tables T. I., N. I., and F. are classed as failures.

Of 134 cases recorded 4 died, giving a mortality of 2.98 per cent.

Of 116 cases detailed, there were, after 3 months:

Cured 67.....	57.8 per cent.
Improved 15.....	12.9 “
Failed 22.....	19.8 “

Beside these there remain unclassified:

Cases reported too early, (29) and (69).....	2
Cases cured or improved by a second operation, (2), (5), (23), (80) and (105).....	5
Imperfectly reported, (103).....	1
Died, (21), (38), (84) and (107).....	4
	—
	12

Of 15 cases treated by suture of fatty capsule only, there were:

Cured, 9.....	60 per cent.
Improved, 2.....	13.3 “
Failures, 4.....	26.6 “

Of 27 cases treated by suture through the fibrous capsule, there were:

Cured, 15.....	55.5 per cent.
Improved, 4.....	14.8 “
Failures, 7.....	25.9 “
Died, 1.....	3.7 “

Of 59 cases treated by suture through the kidney substance, there were:

Cured, 39.....	65.1 per cent.
Improved, 11.....	18.6 “
Failures, 8.....	13.5 “
Died, 1.....	1.7 “

Of 99 patients whose sex is reported, there were:

Women, 93.....	94 per cent.
Men, 6.....	6 “

Of 87 patients in whom the side affected is reported, there were:

Right, 76.....	87.4 per cent.
Left, 7.....	8. “
Both sides, 4.....	4.6 “

CASE 1.—Trans. of the Philadelphia County Medical Society, vol. x., 1889, and *Medical News*, April 20, 1889) was a successful case of nephrorrhaphy for floating (?) kidney. Her present condition is entirely satisfactory after the lapse of 18 months.

CASE 2.—Mrs. F. M., seen May 16, 1889, æt. 27 years; 5 feet, 6 inches; weight 115 pounds; married at 19; one child 7 years old.

Three years ago she had an operation for laceration of the cervix, by Dr. W. T. Lusk, of New York, who also made a diagnosis of retro-

version of the uterus, and movable kidney. Ever since childhood she has had a "queer feeling as if she were not right in the right loin and back." Her back was weak, especially on exertion. These symptoms became much worse since the birth of her child. Two years ago she fell from a step-ladder while cleaning house, and was in bed several days with pain in the back. A year ago she had an attack of excessively severe pain in the pit of the stomach attended by vomiting. While abed in this attack, she discovered a lump on the right side. A month later she had another severe attack of epigastric pain following reaching to a height. Since then there has been pain in the tumor. She has had many symptoms of acid dyspepsia, with a good deal of eructation and canker sores in the mouth. At first the tumor was very tender at times, and painful, but this has improved to some extent, since she has worn a flannel binder, as recommended by Dr. Lusk.

At Christmas, 1888, she had a severe attack of continuous pain lasting for three weeks, attended by great nervousness, which she attributed to renal trouble. Menstruation is very painful, and always attended with clots. There is no leucorrhœa.

Physical examination shows a tumor the size and shape of a kidney. Usually it lies in the right iliac fossa, but can be pressed back into the loin, and up to the umbilicus. It is moderately tender. Percussion shows a moderately tympanitic sound in the right loin.

*Urine.*—Sp. gr. 1024; slight amount of albumin. Her physician states that she has had albumin at different intervals.

*September 16, 1889.*—Present, Drs. W. J. Taylor, Girvin, Fritts and others. Chloroform was administered instead of ether on account of the intermittent albuminuria. The patient was turned well over on to her left side, and a firm pillow was placed under the abdomen. An assistant made pressure over the anterior surface of the abdomen, to push the kidney into position.

The space between the twelfth rib and the crest of the ilium was about four inches long. I made an incision about four and one-half inches long, beginning at a point two and a half inches to the right of the middle line, running obliquely downward at about the middle of this space.

As soon as the aponeurosis was divided, the perinephric fat bulged into the opening. Tearing through this, a hard body was felt beyond. When exposed, its color aroused my suspicion, as it was far darker than the kidney. Exploring downward, to my surprise, I found that it was the liver, and on seeking its lower border, I found it lay below the crest of the ilium.

With the greatest difficulty I was able to reach the kidney, which lay as far down as possible in the right iliac fossa. I was not able to reach it sufficiently well to bring it up to the incision, but having fixed it by my fingers, I was able to pass a tenaculum on them as a guide, and harpoon it. By this means I drew the kidney up into the wound and held it there. I then passed four boiled silk sutures through the aponeurosis on each side of the wound, and through the parenchyma of the kidney. These held it fixed. In this position it blocked up and closed both the small opening in the peritoneum and that of the lumbar wound.

The muscular walls of the opening were then brought together by buried catgut sutures, and the skin was united by silk sutures. A few strands of horse hair were introduced for drainage. An abundant sublimate dressing was then applied, and the patient put to bed in very good condition. Only two ounces of chloroform were used.

Immediately after the operation she had excessive pain at the pit of the stomach, radiating from the epigastrium to the right shoulder, with considerable belching of gas. It was so severe that her physician, Dr. Fritts, who stayed with her, administered one-half grain morphia. The pain and vomiting which accompanied it continued steadily for about four days; by this time her bowels, which had been greatly constipated by the morphia, were freely moved by bitartrate of potash, and as soon as this was accomplished the pain ceased. Her highest temperature slightly exceeded  $100^{\circ}$  only twice, and was down to the normal on the fourth day. On the fourth day the stitches were removed, and the wound was apparently all healed. Up to the time when her bowels were moved, I had been very anxious lest the pain and vomiting were the precursors of peritonitis caused by my unintentional opening of the peritoneum, but the low temperature, and lack of tenderness over the abdomen, and finally the relief which she obtained from the free opening of the bowels, relieved my apprehensions. The attack was similar to her other severe attacks of the gastric disturbance in the past.

On the sixth day the wound reopened, discharging a considerable amount of dark fluid, which was evidently disintegrated blood. There were probably two ounces in amount. It continued to discharge in a gradually diminishing amount, until the end of the second week. At that time it ceased, and the wound finally closed. This delay in the closure, and accumulation of blood in the wound was due undoubtedly to the failure of my attempt to secure union practically without drainage.

*November 17.*—Three weeks having passed since the other operation, I to-day shortened the round ligaments of the uterus for the intractable retroversion. I had no trouble in finding the ligaments; there were no adhesions of the uterus, but whether there were any adhesions about the round ligaments, I do not know. Certain it is, that on the right side the ligament was drawn out with great difficulty, and required, in fact, a force almost sufficient to rupture it. The uterus was lifted into place by a sound, and at the close of the operation was supported by a suitable Albert Smith pessary. Each ligament was shortened about one and three quarter inches, and secured to the pillars of the ring by three silk sutures; the remaining slack was coiled up and laid in the wound. No reaction followed the operation, and on the seventh day the superficial stitches were removed, and the wound was well. I kept her in bed for five weeks from the first operation on the kidney. Shortly afterward she went home perfectly comfortable, though not up to her usual strength, of course. I gave her careful directions not to dance or lift heavy weights, to avoid false steps, etc., and report to me monthly for about three months, at which time I hoped to remove the pessary.

*April 21, 1890.*—Soon after the operation, a blind spot appeared in one eye, and, two months ago, in the other. Dr. Harlan, who examined the eyes, reports the media and fundus clear, with hypermetropia and asthenopia. Her general health is excellent, with the exception of marked nervousness. The kidney is perfectly in place, and she has not the least trouble from it. The result in general is most satisfactory.

CASE 3.—Miss T., æt. 31 years, was seen February 14, 1890, Jefferson Medical College. Clerk in dry-goods store for twelve years. Has been an invalid for three years. At that time when reaching upward for a bale of goods she felt something give away in her right loin. In addition to this feeling she distinctly "heard a snap." She has had pain there ever since. She could not even lift a light package of goods after this. Her back gives out, and very often she can hardly raise herself. Intense pain in the back and universal weakness characterize these attacks, which come on from time to time. The legs, especially the right one, seemed also to give out, and she could only walk a few steps at a time. Sometimes, when lying down, the legs would have to be flexed.

After the attack, she recovered sufficiently to half do her work at the store for a short time, but was compelled soon afterward to give it up, and has led a miserable life since.

She has had no pain on the left side; suffers constantly with severe nervous headaches, and especially pain in her right eye.

In the summer of 1889, for the first time she discovered a lump in the abdomen. It changes its position with her change of posture; when lying on the right side it lies under the right border of the ribs; when standing it lies below the umbilicus, in the right iliac fossa; if she turns on the left side, it falls "sometimes with a thud, as though it stayed in the right side a moment, and then fell" It can be pressed to the left of the middle line. It is hard, slightly tender, markedly so at one point; it is about the size, and obscurely about the shape, of the kidney. A vessel can be felt pulsating at its border, but the hilum can not be distinctly made out.

Percussion in the loin gives a slightly more tympanitic note on the right side than on the left, but this is not very marked. The tumor can be easily pressed back into the position of the right kidney.

She cannot lie on the left side without a sense of suffocation, which even awakens her from sleep. Her general health, apart from her weakness and pain, is fair. Her menstruation is somewhat irregular. Her fluctuations of feeling well and of great prostration are very sudden and unaccountable.

*Operation.*—In my clinic at the Jefferson Medical College Hospital, February 19, 1890. The usual lumbar incision was done. As soon as the perinephric fat was torn through the kidney was discovered without difficulty. I was able to sweep my finger around the upper border of the kidney, and, by depressing it, to see the slow, rhythmic, respiratory movement of the liver through the thin peritoneum. The kidney was not only moved with the respiration, but when the pressure by the abdominal hand was withdrawn, the kidney slipped out of place, and, also, out of sight, so that it had to be harpooned with a tenaculum before it could be brought up into the wound.

The kidney was normal both to touch and sight. It was fastened by six silk sutures, two through the anterior lip of the wound, two through the posterior, and one at each end.

After the operation her highest temperature was  $99.8^{\circ}$ , a rise of only  $.2^{\circ}$ , and it reached the normal on the third day. The catheter was required. She had considerable pain running from the kidney down into the right groin. She made an uninterrupted recovery within ten days, but was kept on her back for four weeks. At the time of leaving the hospital the kidney was normal in position, and very slightly tender. The wound in the loin was a cicatrix as wide as the little finger. The ovary in Douglas' cul-de-sac was only slightly tender. Her nervousness was slightly better; in fact nearly gone.

*April 30, 1890.* After returning home she had a severe intestinal attack, but on recovering from this regained her appetite and is gaining strength. The kidney is perfectly comfortable, though it is still sore. All the pains prior to operation are gone. She is able to walk about, but not yet very far.

CASE 4.—A. G., referred to me by Dr. O. H. Allis, February 26, 1890.

The patient was a physician, æt. 25 years, nearly six feet tall; weight 130 pounds; his best weight 165 pounds three years ago.

Familly history negative, except that his grandfather died of phthisis. His general health was good up to two years ago, when aching began in the right loin. This, he at first thought, was muscular. Examination of the urine soon showed albumin in considerable quantity with tube casts. Basham's mixture seemed to do him good, but did not relieve the pain in the loin. A diagnosis of Bright's disease was made by two eminent physicians.

In February, 1889, he was obliged to relinquish all professional work, as any exertion, especially driving, increased the pain. There was always a tired feeling in the right loin, which often passed into a lancinating pain so severe as to cause him to take his bed. These pains radiated to the right groin, and were only relieved by hypodermatics of morphia, which was required in doses up to one grain. He had slight fever. He never passed calculi or gravel. After an attack of pain he often passed blood, but never at other times. Microscopical examination, however, has frequently showed blood in the urine, between the attacks. These attacks of pain now occur as often as once a week. No albumin is found in the urine, as a rule, except after an acute attack, when it instantly appears. His condition was so serious that unless he obtained relief it seemed certain he would succumb before long.

Prof. Holland examined the urine with the following result: Reaction alkaline; odor putrid; sp. g. 1022; quantity 40 oz.; large amount of albumin with copious deposits of oxalate of lime; pus corpuscles, phosphates; granular and hyaline tube casts; urea and urates normal in amount; no sugar or bile. Diagnosis: pyelitis and Bright's disease.

On physical examination the right kidney was found to be tender even on slight pressure. No mobility of the kidney was detected. I regret to say, however, that no examination was made in various postures to determine whether the kidney was movable or not. His sufferings were so great that it did not seem possible that they could come from anything else than serious organic disease of the kidney.

Himself and his father, both physicians, as well as Dr. Allis, came to

the conclusion that probably there was a calculus in the kidney, in which conclusion I concurred, as the most probable cause of the present trouble, though I thought possibly there was only a pyelitis or tubercular disease. Movable kidney did not occur to us.

I recommended that an exploratory operation be done, with a view of evacuating the pus or removing the stone (if any were present), and, secondly, to examine the kidney itself, and do nephrectomy, if the conditions were such as to require it.

*Operation*, March 6, 1890, assisted by Drs. O. H. Allis and W. J. Taylor. I used chloroform instead of ether, on account of the albuminuria. There was nothing peculiar in the operation until the kidney was reached. The moment it was discovered, it was seen to be exceedingly movable. It moved up and down, with an excursion of not less than two inches at each respiration, and it was easily displaced by pressure with the fingers. Its appearance was normal. The kidney was separated from its fatty capsule by the finger, which was passed over both its surfaces. Its pelvis as well as its substance was examined, but no stone was detected. There was no spot of unusual hardness or softness; in fact, nothing abnormal was discovered, excepting the mobility.

I seized it with a volsella at the lowest portion and made an incision into the pelvis of the kidney. The cavity of the pelvis and calices were thoroughly explored by the finger. No stone detected, nor any pus. The bleeding was free, but not at all alarming. Finding nothing to justify the removal of the kidney, I determined, in view of its mobility, to fasten it at once by means of six silk sutures—one at the upper end, and one at the lower end of the wound, two on its anterior and two on its posterior surfaces. All of these sutures were passed through the substance of the kidney. The wound was then packed with iodoform gauze, and an ample sublimate dressing applied.

After the operation, the pain was very great, requiring morphia in half grain doses, up to as much as three grains per diem. The oozing was continuous for the first four or five days, requiring two dressings daily. Considerable blood also appeared in the urine, with some small clots. The blood disappeared from the urine at the end of a week. The passage of the clots down the ureter caused severe attacks of pain, precisely like those he had suffered from previously. His temperature went as high as  $103^{\circ}$ , but fell to the normal on the twelfth day. His stomach was very irritable, and he was exceedingly weak.

On the fifth and sixth days after the operation, it appeared doubtful whether he would recover, and it was decided to send him home, in or-

der that he might at least die surrounded by his friends. He was carried home by boat, with great care, and reached there without mishap. For several days it was still doubtful whether he would recover, but on the twelfth day his temperature fell to normal; the pain, though still constant and severe, was less than before, and he began to gain in strength. The dressings now had to be changed more frequently, sometimes as often as once in three hours, on account of being wet with urine.

On the twelfth day his stomach was able to bear solid food, in small amounts, and his appetite increased. His father attributed much of his pain to a malarial element in his constitution, which several times had given him trouble. Quinine relieved it to some extent.

On about the eighteenth day the wound was healing very well, and he sat up in his chair for an hour. From this time on his condition improved almost daily. He gained in strength, and soon began to walk about; his pain diminished very much, and in a month one-sixth of a grain of morphia did him as much good as one grain did just prior to the operation. At the end of six weeks the wound was entirely well. The urine was clear, with no albumin and no tube casts.

*May 2, 1890.* Just two months after the operation he called at my office. The wound was healed, except a pea sized spot of granulations. For a month he has been entirely free from all pain and has taken no morphia whatever. He has gained 10 pounds in weight. This case was by far the severest in suffering and the most serious in prognosis I have ever seen. Not the health and comfort, but life itself, was threatened. In fact death seemed only a question of time. The albumin and tube casts seem to have been due entirely to the movable kidney. Thus far the result has been most satisfactory.

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