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REMARKS ON EXTIRPATION OF THE KIDNEY,

WITH CASES OF NEPHRECTOMY FOR PYONEPHROSIS AND NEPHROTOMY FOR RUPTURE OF THE KIDNEY.*

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In September of last year a young woman, aged twenty-three, came under my charge at the New York Hospital for a tumor in the right hypochondriac region, of which she gave the following history:

In 1876, seven years previously, she had a severe and obstinate attack of cystitis, which lasted, in spite of all treatment, for two years, when, at the Roosevelt Hospital, a vesico-vaginal opening was made to place the bladder at rest. This gave such relief that at the end of a year she had the opening closed by an operation, believing herself fully cured of the cystitis.

But this proved not to be true, for the symptoms reappeared, and six months later the wound was reopened. In September, 1880, the fistula, which had become contracted, was enlarged at the Woman's Hospital. After remaining there for some time with moderate improvement, she left that institution, but came back again in September, 1882, the irritability of the bladder being worse, if possible, than ever before. The urethra at that time was button-holed, as it is called by Dr. Emmet; in other words, an incision was made along the lower floor of the ure-

* Read before the New York Surgical Society, December 9, 1884.

thra, and the superabundant mucous membrane drawn out and removed. But shortly after this she had such severe pain that it led to an examination under ether for stone. No calculus, however, was found in the bladder, but it was observed for the first time that there was a tumor in the right upper part of the abdomen. Thinking this was possibly due to the presence of a calculus in the ureter, a sound was introduced into the right ureter through the vesical fistula, which had been further enlarged, but with negative results. I believe that an operation for removal of the kidney was then suggested, but the patient went out of the hospital, and afterward came under the care of Dr. Peters, at St. Luke's Hospital, where an exploration with the hand in the rectum was made, and also an endeavor to catheterize the ureters. No positive evidence was obtained by these examinations. When the patient entered my ward there was felt on the right side of the abdomen a smooth, but somewhat painful, tumor, which stretched from the edge of the ribs nearly to the crest of the ilium, and which measured some four inches in its transverse diameter. This was believed, from its situation and history, to be a kidney in a condition of pyonephrosis. Aspiration having failed in extracting any pus, and, in consequence of the report furnished that the previous rectal examination had gone against the renal nature of the tumor, the patient was again etherized, and, by the small and skillful hand of Dr. Sabine, the regions of the kidneys were carefully examined, and the tumor proved to be, as thought, a diseased kidney. At the same time, by strongly holding aside the large fistula in the bladder, the mouths of the ureters could be seen and explored their whole distance by flexible metallic sounds. There was no calculus to be discovered, and, while the urine from the affected kidney was flocculent from the admixture of pus, that from the left or sound side was clear and normal. On each side it was voided in intermittent jets.

The patient's general condition was fair, though her annoyance from the continued urinary leakage was great. During the time she was kept under observation before the operation the urine was repeatedly examined, showing a satisfactory specific gravity and absence of casts. This increased the confidence

that the left kidney was in a good condition, in spite of the statement that she had had several convulsions during the past three years. During the two weeks prior to the operation her condition began to fail, less perhaps from inflammatory than from mental causes. She was urgent for surgical interference, though aware of the danger of the procedure. An operation possessed no terrors for her, as she had already been anæsthetized twenty-three times since her cystitis began. Nephrectomy was performed November 3d, under antiseptic precautions, by a lumbar vertical incision, starting just below the twelfth rib, three inches from the spine, and running to the crest of the ilium. A second, transverse, cut was made from near the top of the vertical one, outward along the edge of the ribs, nearly five inches long. This gave large access to the kidney without opening the peritonæum, which was seen at the outer part of the transverse incision, but sunk out of the way by the semi-prone position of the patient. On exposing the dense fatty capsule, it was scratched through and the kidney partly brought into view. An aspirator showed the situation of an abscess, which was opened to determine whether simple nephrotomy with drainage would suffice. Exploration showed that it was a small cavity, and apparently others existed which did not open into the first one; extirpation was therefore proceeded with. It was at once found that the fat capsule was intimately adherent to the kidney, the true fibrous envelope of the organ was therefore split open, and enucleation accomplished with rapidity everywhere except over the anterior surface of the kidney, where the peritonæum was felt to be very thin. The pedicle was finally reached, and a loop of strong ligature silk cast around the kidney, carried to its base, and tied, after which the kidney was removed. A gush of venous blood ensued, which was only partly arrested after repeated seizures with long forci-pressure forceps, but was finally controlled by stuffing the wound full of sponges and turning the patient on her back. The shock was profound, and all the measures to produce reaction were resorted to, such as heat, stimulants, the application of Esmarch's bandages to the limbs, and saline transfusion. The latter, repeated twice to a total amount of twenty-two

ounces, gave rise at first to great improvement in consciousness, pulse, and warmth of body, and up to 10 o'clock P. M. she appeared to rally, but then failed steadily, and died at 2 A. M., ten hours after the operation.

The autopsy showed that the hæmorrhage came from a vein of considerable size, 1·5 centimetre above those secured by the ligature and forceps. The fibrous capsule of the kidney was so closely adherent to the condensed fat without that it could be removed only by a close dissection. The peritoneal cavity was not invaded. The left kidney was larger than normal, and, microscopically, the convoluted tubes contained a good deal of fat in their epithelial cells. This change was quite general.

The removed kidney, slightly larger than natural, was riddled with abscesses, which did not communicate one with the other, and only partially with the pelvis. There was no serviceable kidney tissue to be found in the organ.

Remarks.—The operation of nephrectomy, first resorted to intentionally by Simon,* in 1869, has now been performed, so far as I have been able to investigate, some one hundred and fifty-two times,† with a gross mortality of seventy-six deaths, or fifty per cent. Nor has the mortality decreased in the last fifty cases, as might have been expected. It is, therefore, yet one of the gravest operations in surgery.

It has been employed for the removal of healthy as well as of diseased kidneys. In the former category may be placed the extirpation for ureteric fistula, for floating kidney, and for laceration of the organ. In the latter, the

* Wolcott, of Milwaukee, was perhaps the first to remove the kidney, in 1860, for a carcinoma. The patient died on the fifteenth day.

† The original collection of one hundred cases by Harris, in the "Am. Jour. of the Med. Sci." for July, 1882, was augmented in Bolz's thesis to one hundred and twenty-one cases, which Billroth further increased to one hundred and thirty-two. Subsequently S. W. Gross collected one hundred and forty-three cases, to which I have added three performed by Dr. Thomas, two by Thornton, and one each by Boothby, Halsted, Morris, and myself, which makes the total one hundred and fifty-two.

lesions may be embraced generally under the heads of obstructions, suppurations, and tumors of the kidney.

For wounds or lacerations the kidney has been extirpated five times (Brandt, Marvand, Cartwright, Rawdon, and Bruns), with two deaths. For fistulæ communicating with the ureter, and situated either in the vagina or the uterus, or communicating externally, there have been reported nine cases, with two deaths. For floating kidney sixteen cases are recorded, with six deaths—fourteen by laparotomy and two by the lumbar incision. The mortality for this condition is so high that it would of itself discourage the operation for an affection which does not threaten life. But, since the introduction by Hahn of the plan of fixing the loose kidney after exposure by a vertical lumbar incision, by stitching its capsule to the muscular or skin tissues, the use of nephrectomy for this reason will probably be abandoned. The operation of neprhorrhaphy has been performed sixteen times with but one death—due to a fault of the operator—and with generally satisfactory results. In the case operated on in this way by myself, and published in the "New York Medical Journal" for February 17, 1883, the subsequent history was encouraging, though several months afterward the patient had a severe attack of jaundice, and some symptoms indicative of a perinephritic inflammation. These passed off, and she has recently reported herself as much benefited by the operation. The appreciation of this method is, however, not yet definite, since too short a time has elapsed to determine whether the fixation produced is truly a permanent one.

Although hydronephrosis is one of the conditions for which extirpation of the kidney is done, yet, according to the excellent remarks of Billroth* on the operation (from

* "Ueber Nierenexstirpation," "Wien. med. Wochenschrift," Nos. 24, 25, 26, 1884.

whom in part my data are obtained), the only diseases demanding the operation are neoplasms and suppuration of the kidney. It is significant that nearly one third (twelve) of the cases of nephrectomy for hydronephrosis have been accomplished through an error of diagnosis, being mistaken generally for ovarian cysts.

The death-rate, whether from this cause or from the inherent difficulty of the removal of a hugely distended kidney, is very large, for, in the twenty-one cases collected by Staples, * where nephrectomy was employed, there were by laparotomy seventeen cases with eleven deaths, and by the lumbar incision three cases with one death. In contrast to this mortality are the striking results obtained by incision and drainage in sixteen cases of this affection collected by the same observer, in which there were fourteen cases of recovery and two deaths. In some of the recoveries it is true fistulæ resulted, but were reported as diminishing or as not troublesome. In this connection I would refer to the case of hydronephrosis where nephrotomy was successfully used by me, and which was presented to you by Dr. Peters in his paper on Hydronephrosis † before this society February 28, 1882. Bergmann has also stricken out hydronephrosis from the list of diseases requiring nephrectomy for their treatment.

From the foregoing remarks it will be seen that the principal interest connected with the operation of extirpation of a kidney is associated with tumors and suppurative lesions of that organ. In respect to the nature of the neoplasms for which the kidney has been removed, it is found, from the twenty-seven cases collected in Homans's ‡ article

* "Hydronephrosis; A Study of Seventy-one Cases of that Lesion," by G. A. Staples. "Jour. of the Am. Med. Assoc.," April 19, 1884.

† "Med. Record," May 6, 1882.

‡ "Boston Med. and Surg. Jour.," January 24, 1884.

on the subject (to which I have been able to add two cases by Thomas, and one each by Vercelli, Little, and Halsted, making a total of thirty-two cases), that they have been sarcoma eighteen times, carcinoma nine times, adenoma once, fibroma once, and of doubtful nature three times. Twenty-two of these patients died, or nearly sixty-nine per cent. This mortality, so much greater than in any other lesion for which nephrectomy has been performed, will attract attention at once, and the inquiry will naturally arise, What has been the outcome even in the successful cases? This point has been well considered by S. W. Gross in the "Medical News" for June 9, 1883, who states that the disease returned in 31·5 per cent. of the cases, and that the average duration of life was rather less than twenty-four months. Taking this fact in connection with the statement of Rohrer and Roberts that the average duration of life without operations is two years and a half for adults, and of Dickinson that in nineteen autopsies, in cases of malignant disease of the kidney, in sixteen cases secondary growths were found, the operation of nephrectomy is at first sight to be discouraged. It may be, however, somewhat premature to pronounce upon this question dogmatically until experience is increased, especially since two of the patients remained well after the operation for twenty-one and thirty months respectively. It certainly seems correct to urge that only small growths should be submitted to the operation, on account of the risks of hæmorrhage and of relapse which more decidedly belong to the larger tumors, and from the fact that in such cases the safer lumbar incision can be employed, for, in thirty-two cases, twenty-five patients were treated by the abdominal incision, of whom twenty died, and seven by the lumbar incision, of whom two died.

By the foregoing process of exclusion it is fairly well shown, I think, that the principal, if not the sole, condition

in a diseased kidney that justifies a nephrectomy is a suppurative process. Under this head are embraced abscesses of the kidney, whether single or multiple, or whether in the pelvis or in its substance, or simply pyelitis from cystitis or from renal calculus, etc.

Of such cases Billroth, quoting from Bolz, gives forty instances with eighteen deaths: this I have been able to increase to forty-seven cases, but, from a private communication from Dr. S. W. Gross, I can now present a total of fifty-eight cases, and from an analysis of this number I shall endeavor, if possible, to furnish a due appreciation of some of the mooted points connected with this domain of renal surgery.

The first, and probably one of the most important, considerations in connection with the operation of nephrectomy is the question of not only the existence of a second kidney, but also of its condition. Given abundant pus with certain renal elements in the urine (and even these may be utterly absent, if the abscess does not communicate with the pelvis of the kidney), to which kidney do these characteristics point? We may not always have a tumor to determine this, and this notably in some instances of renal calculi, but, even though a latero-anterior tumor presents itself, yet the status of the second kidney should be determined if possible. Repeated examinations of the urine with absence of casts and epithelium may contribute toward a certainty, but, since we find, even with a presumably sound kidney, so frequently suppression of urine following a nephrectomy (possibly due to a weakened heart from shock), it is not to be wondered at that endeavors have been made in various ways to arrive at positiveness in the solution of this difficult point. One of the greatest arguments made in favor of the abdominal section is the ease with which thereby the existence and general condition of a second kidney is determined. This

is a serious consideration, and is brought home to us, for in the cases of nephrectomy performed in this city—viz., those of Peters, Wright, Wylie, Polk, Lange (2), Thomas (3), Halsted, and my own, in all eleven cases with nine deaths—in two there was but a single kidney (Polk's and Lange's). In the first there was congenitally but one kidney, and that abnormally situated in the iliac fossa, as in the specimen of a left kidney, the right being normal, which I can now show you, which was removed from a cadaver by our pathologist, Dr. Peabody, who states that it is the only example of this anomaly met with by him in over two thousand post-mortem examinations. The single kidney is found about once in five thousand bodies; hence such a surgical complication can fairly be disregarded.

In Lange's case of tumor of the kidney the other kidney was found to have been converted by previous changes into a shriveled, caseous cyst.

Undoubtedly the abdominal incision would have permitted the avoidance of this surgical error, but when we reflect on the rarity of such complications, and on Bergmann's statement that in forty cases of nephrectomy for pyonephrosis only once was the other kidney damaged enough to be useless, and also on the mortality that has followed this method of operation for suppurative lesions of the kidney, we are forced to look about for other means than laparotomy for help in this connection. This mortality is as follows: Of the fifty-eight patients referred to, thirty-one recovered and twenty-seven died; sixteen of these were treated by the abdominal incision, with ten deaths, or a mortality of 61·5 per cent., and forty-two by the lumbar incision with seventeen deaths, or a mortality of 42·8 per cent. Separating these cases still further it is found that fourteen of them were for calculous pyelitis, with four deaths, and that of this number only one was treated by the

abdominal section, with recovery. This shows clearly that, unless, as was the fact in this case (Wright's), the diseased kidney was at the same time a floating or abdominal kidney, the lumbar incision is by all odds to be preferred, not only because it is safer but because it also permits the simpler extraction of the calculus, and with less risk from the possible urinary fistula that may result. Taking now this form of kidney lesions from the comparison of the abdominal and lumbar modes of nephrectomy, we further find in the forty-four cases remaining that the abdominal incision was employed fifteen times with ten deaths, and the lumbar twenty-nine times with thirteen deaths, again showing the superiority as regards mortality of the posterior or extra-peritoneal incision. It is true that a wonderful success has been shown by Thornton in ten nephrectomies of all kinds by the anterior incision without a single fatal result, and Tait has also from a smaller number given his authority in favor of the method; but, on the other hand, it is to be said that a number of these cases were errors in diagnosis and unintentionally attacked, many were hydronephroses, some were tumors, and but few suppurative lesions. Czerny, who of all surgeons has had the largest experience, having removed eighteen kidneys, strongly urges the advantage of the lumbar incision, and Billroth, in comparing the two methods, advocates the posterior operation, which he says should be used, moreover, when "in doubt." The conclusion is therefore evident that for large tumors, which in my judgment negative the operation, and where not only the size, but the amount of hæmorrhage, is to be thought of, the abdominal method is more favorable; but for small tumors, or for pyonephrosis of all kinds, with, in the last class of cases, the risk, always great, of their rupture and infection of the peritoneal cavity, this incision is not to be selected. In addition to these reasons there is another,

which has recently been set before us by Lucas * in his excellent paper on this subject, that many cases of suppurating kidney can best be treated after their exposure by the lumbar method, by incision and drainage, and, after these measures have failed to cure the patient, then extirpation can be effected with much less risk to life. He gives six cases, of which all recovered, in which nephrectomy was done in this manner. I confess that, until the logic of his statistics and personal observations had convinced me, I had entertained a reverse idea from an experience obtained in Roosevelt Hospital in 1878. I had then a renal tumor to deal with on the left side, which, after exposure by a lumbar cut and aspiration, followed by an incision to evacuate a large amount of matter, was treated by drainage, a consultation of my colleagues having decided against nephrectomy. The patient did well for a while, but eventually succumbed to a subperitoneal phlegmon, which started from the kidney and descended to the pelvis. I have since watched the progress of two sinuses formed from similar kidneys, and they have each completely recovered without nephrectomy, and last week nephrotomy and drainage was done in a similar condition by my associate, Dr. Abbe, with so far satisfactory results. All these cases tend to present the claims of a lumbar incision in strong light. The question which therefore we come back to is, whether the determination of the existence and condition of the second kidney can be reliably arrived at. This is truly not easily answered.

Tuchmann was one of the first to continue and employ an instrument like a lithotrite which was intended to occlude at will one of the ureters from within the bladder. It failed to work. Later, when this question obtruded itself in the

* "On the Surgical Diseases of the Kidney and the Operations for their Relief." R. Clement Lucas, "British Med. Jour.," September 29, 1883.

minds of surgeons, Glück suggested that a preliminary incision should be made in the loin down to the diseased kidney, and its ureter clamped while iodide of potassium was administered, and the urine of the other kidney was extracted from the bladder and tested for iodine. I do not know that this procedure was ever put into practice. Lange suggested an incision over the sound kidney to permit a digital examination of it. Catheterization of the ureters, practicable though difficult in the female, has been called into use, and in that sex affords some hope of certainty. In the male, however, unless through a perineal opening to guide the finger and catheter, the chances are much against its efficiency. Polk,* in his endeavors to avoid a repetition of his case, has devised a clamp, one blade of which is to be passed into the male or female bladder and the other into the rectum so as to compress the ureter between them. This seems rational, and may yet prove of service, though in the male, as for catheterization of the ureters, a perineal opening would probably be necessary. Struck, in 1882, by the efficiency of Davy's rectal rod in controlling the circulation of the iliac artery in an amputation at the hip joint, I thought, by broadening this rod a little, so as to compress more space, that the ureter might at the same time be occluded, and it has proved satisfactory in the single case in which I have yet employed it. In a recent number of the "British Medical Journal" is an account from Mr. Davy himself, in which he states that he suggested this application of his rod in 1873, and that he has recently used it with success.

Another expedient which attracted me yet more favorably is that presented by Dr. H. B. Sands, and is based upon his experience of compressing the iliac artery for over an hour with the hand in the rectum. This surgeon advises that

* "New York Med. Jour.," February 17, 1883.

the same means be used to obliterate the ureter temporarily, while the secretion from the other kidney thus separated is collected by a catheter in the bladder and examined. Unfortunately for absolute accuracy the ureter is so soft and yielding as not to be readily recognized by the fingers as it crosses the edge of the pelvis, yet several trials on the cadaver have shown me that in every instance compression of the artery with two or three fingers at the same time occludes the ureter. This method has another great advantage, which is this, that, unless the narrowing of the rectum, which occasionally is met with is present, the hand, if small enough—i. e., less than 8·5 inches in circumference—can be introduced up to the sigmoid flexure, and thereby be allowed sufficient excursion to permit reaching the lower portions of the kidney of each side.

Reference must also be made to the device of Silbermann,* who introduces through a large catheter little rubber bags, attached to slender flexible catheters, which are subsequently filled with quicksilver by a syringe, and are intended to plug by their weight the mouths of the ureters. I have not been able to obtain any good results from this instrument, which is now shown to you.†

In a doubtful case, not otherwise to be solved, an exploratory or small abdominal incision, as advised by Tait, could be made. Billroth, it will be remembered, made such incisions twenty-seven times without harm in pyloric cancer, by which he determined the inoperable nature of the disease. The following cases of abscess resulting from laceration of the kidney illustrate the advantage of this procedure:

Laceration of Kidney; Abscess; Nephrotomy; Recovery.—Mary Q., a young married woman, aged twenty-six, was ad

* "Berl. klin. Wochenschrift," No. 34, 1883.

† Silbermann shut off the ureter twenty-seven times in the ten women and five men upon whom he employed his instrument.

mitted October 6, 1884, to the New York Hospital, with the history of a miscarriage in May last, with persistent uterine hæmorrhage until August. During this time she had had repeated attacks of inflammation in the abdomen, the last of which, in August, confined her to the bed. After this she was well until her last menstruation, September 15th. After her usual flow had lasted five days, she began to have fever, with nausea and pain in the abdomen. She was admitted at first to the medical division of the hospital, where a tumor was discovered just above the right ilium, into which a hypodermic needle was inserted and a syringeful of pus withdrawn. Her temperature ranged from 100° to 103°, and her urination was frequent and painful, and microscopically contained pus, casts, and blood. On interrogation she positively denied receiving any injury. When first seen the tumor extended from the edge of the liver, whose dullness was continuous with that of the tumor, to nearly the crest of the ilium, and in its transverse diameter it was nearly five inches broad, painful on pressure, smooth and resisting. A hypodermic needle failed on a second trial to extract anything but pure blood. With the history given the nature of the tumor was felt to be doubtful, as exploration *per vaginam* disclosed the adjacent parts uninvolved, and it was therefore determined to delay until the evidence of suppuration was given by aspiration or otherwise. Although her temperature range was, as before, as high as 103° F., her general condition was comfortable. Three days later another puncture in a different locality resulted in the same extraction of blood, but on the fifth day pus was obtained by the same test, the urine being, during this time, nearly normal in character. She was etherized, and in the class of students present was the patient's physician, who furnished the important detail of a kick received by her some ten days prior to her admission to the hospital, from a person whom she was unwilling to implicate, whence her repeated denials when questioned. After the injury there was for two days perceptibly bloody urine.

In the hope of the abscess being a perinephritic one, an exploratory incision was made over the outer edge of the tumor, between the middle of the crest of the ilium and the ribs, so

that if it were such, it might be possible to keep behind the peritonæum, and, if it were not that, the benefit of an ordinary abdominal exploratory section might be enjoyed. Before the peritonæum was fairly reached, the wound permitted a conclusion against an abscess of any size exterior to the kidney, and the finger was therefore carried into the abdominal cavity, and the enlarged, and in spots softened, kidney easily and quickly recognized. The abdominal wound was closed by silk sutures, and the patient turned over, and the usual incision from the ribs to the ilium, along the quadratus lumborum, made, the kidney reached, exposed, and found so softened that with a thrust of the finger a cavity was opened, containing considerable grumous bloody pus, on evacuating which a jagged rent could be felt running toward the free border of the kidney and downward, which was evidently a laceration from the kick. A large-sized rubber tube was inserted into the cavity of the abscess, and the wound antiseptically dressed. The temperature fell at once, and the patient did well subsequently, with a free discharge from the posterior wound for forty-eight hours, when it rapidly decreased. Ten days later the tumor had much diminished in size, but at its lower portion was yet tender. From the wound a probe was crowded in this direction, and gave exit to a small quantity of blood and pus, and over the probe a small rubber drainage-tube was carried, and by the thirteenth day the temperature was normal. The anterior wound healed promptly, the sutures being removed on the fourth day. The posterior wound was entirely healed November 6th.

Now, December 5th, there is felt some hardness anteriorly at the region of the lower part of the tumor, but above normal intestinal resonance. It looks as if there had been some perinephritic inflammation as well as renal.

Incidentally in these remarks the advantage of nephrotomy over nephrectomy has several times been alluded to or illustrated. I beg now to call attention to a further extension of renal surgery of equal interest to us all. I refer to the treatment of calculous suppression of urine.

Roberts, of Manchester, had shown that the diagnosis of

such cases was not always difficult, that a history of renal colic of one side at some previous time, with a recent similar attack on the other side, with slight or intermittent discharge of urine of low specific gravity, pointed clearly to the difficulty which terminates nearly always fatally in from six to ten days. In an article on Renal Calculi, published by me in the "New York Medical Journal" of August, 1880, the suggestion was made that as the arrest of calculi took place as a rule either within the first three or four inches of the ureter, or at the vesical end, relief was to be afforded either by an incision in the loin, into the pelvis of the kidney, or the distended ureter, or that by the hand introduced into the rectum the calculus might possibly be squeezed into the bladder, if sufficiently small.

In the "British Medical Journal" for March 8, 1884, Mr. Bennett May recommends nephrotomy for this same purpose, though he had never carried the project into execution.

Lately Mr. Morris, in the "American Journal of the Medical Sciences" for October, 1884, suggests the use of a perineal opening into the bladder to permit its exploration and the detection of a renal calculus when impacted at its vesical outlet, and gives a plate of an elongated gum lancet to accomplish the incision of the vesical tissue covering the calculus. I have been on the outlook for a case in which I could put into operation my surgical convictions on this subject, but its demonstration, as far as I can learn, has only been accomplished by Bardenheuer, of Cologne.

This surgeon, in a case of complete anuria with threatened acute uræmia from calculous occlusion of the right ureter, subsequent to destructive suppuration of the left kidney, cut down upon the right kidney by the usual vertical incision in the loin, and supplementing this by another incision parallel to the crest of the ilium. This gave a free ex-

posure of the kidney, which was separated from its fatty capsule along its anterior face until the pelvis and ureter were reached. A calculus was felt in the ureter, near the kidney, the size of a bean; this was cut open, removed, and the finger passed upward into the pelvis of the kidney, where four other small calculi were found and extracted. The ureter was then sewn up, and the wound packed with an antiseptic dressing. The patient recovered.

The Incisions.—The method resorted to in the case of nephrectomy given in this paper seems to be the best of the lumbar incisions, as it affords the greatest amount of extra-peritoneal space. The usual vertical one, running from just below the twelfth rib to the crest of the ilium, along the external border of the quadratus lumborum muscle, or about three inches from the spine, affords ample room for a nephrectomy of a normal kidney, or for a nephrotomy, but, when the organ is much increased in size, additional room is desired. Enlargement of the wound upward to the twelfth rib, or by removal of the rib, is highly injudicious, as has been shown by the dissections of Holl,* who showed that the pleural cavity, in nearly every instance in the examination of sixty cadavers that he examined, descended as low as the first lumbar vertebra, and that the greater part of the last rib is lined by this serous membrane. Even when the rib is wanting the pleura comes down to the ligamentous tract which supplies the place of the bone. Lange has since shown that not infrequently the pleura comes even lower alongside the spine. In the only fatal case of nephrorrhaphy (Ceccarelli's †) the kidney was attached not only to the wound, but also stitched to the twelfth rib by sutures passed around it. Acute septic pleurisy carried off the patient. In-

* "Archiv. f. klin. Chir.," vol. xxv, 1880.

† "Centralbl. f. Chirurg.," November 1, 1884.

creased space can often be obtained, and safely, by cutting across the middle of the quadratus up to the spine. Also the ribs can be strongly raised by retractors. Czerny several times removed the kidney by a simple transverse incision running parallel to the ribs and just below them outward for from six to eight inches. In my own case there was plenty of space created by the cross-incision, like an inverted L, starting from the upper part of the vertical one and longest in its skin divisions. This is well shown in the specimen presented for your inspection. The peritonæum was seen, but it was kept out of the way by the semi-prone position of the patient. This line of incision is also advocated by Lucas. In a comparatively healthy kidney, or where the organ is the seat of a neoplasm, there is but little involvement of the fat capsule, and it can easily be torn or separated from the kidney. In inflammatory lesions, however, this manœuvre can not be utilized, and the capsule proper of the kidney must be incised, and the enucleation accomplished under the membrane. This may add to the hæmorrhage, but it is often impossible to do otherwise. The specimen shows this very markedly. Lucas has also advised, where the hæmorrhage is severe after the ligature and ablation of the diseased mass, not to spend time in endeavoring to secure the bleeding points by ligature or forceps, but to plug the wound and check it in this way. I was struck too late in my own unfortunate case with the efficacy of this measure. After several attempts to seize and tie the source of hæmorrhage, found after death to be from a venous trunk above the pedicle, I plugged the wound, as will be remembered, and turned the patient on her back, when very little pressure sufficed to staunch the flow. Had this been done earlier the issue might have been different. Special care must be taken not to cut too close to the ligated pedicle. The application of a straight or curved forci-pressure for-

ceps beyond the ligature prior to the ablation is to be advised, to guard against this mishap.

Of the abdominal incisions there are two: (1) the median, running three inches above and below the umbilicus, but less, however, in women with lax bellies. Kocher, however, began his at the xiphoid appendix and ended it at the navel. (2) That of Lagenbuch, along the outer edge of the rectus in the linea semilunaris. By this latter incision the colon is promptly seen, and should be turned to the inner side so that its posterior or outer mesenteric fold can be cut through. This insures less hæmorrhage, and avoids partially a risk that Bergmann ascribes to the abdominal incision, viz., subsequent gangrene of a portion of the intestine from interference with its circulation. When the kidney has been removed Sir Spencer Wells advises the rent in the peritonæum to be closed by sutures; this can not always be done, as the edges are often torn and irregular. There is left necessarily a retro-peritoneal cavity of considerable size, the care of which requires attention. This space, though left to itself by many, has given rise not a few times to abscess or septic processes. Brichetti, in experimenting on animals, urges the necessity of draining this cavity by a tube carried through the skin-wound in the loin. Barwell has also made a similar suggestion, and it seems based on sound surgical principles, but Boothby is the only one who has so far done this with a satisfactory result.*

The conclusion from the broad consideration of the many cases embraced in the paper is, that the important and

* In the discussion that followed the reading of the paper, Dr. Stimson reported a nephrectomy, done in 1883, by abdominal section for a painful movable kidney, in which the posterior peritoneal opening was closed and a drainage-tube carried from the renal cavity out through the loin. The result was a fatal one.

dangerous operation of nephrectomy can and should be more restricted in its application, and for disease that it will be most satisfactorily employed in suppurative processes which have not been relieved by the simpler procedure of nephrotomy.

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