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Nephrotomy for the Relief of Sudden Total Suppression of Urine occurring some time after Nephrectomy.

[With the report of a Successful Case.]

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OF NEW YORK.

NEPHROTOMY FOR THE RELIEF OF SUDDEN TOTAL SUPPRESSION OF URINE OCCURRING SOME TIME AFTER NEPHRECTOMY.[1]

[WITH THE REPORT OF A SUCCESSFUL CASE.]

By WILLY MEYER, M. D.,

OF NEW YORK.

ATTENDING SURGEON TO THE GERMAN AND NEW YORK SKIN AND CANCER HOSPITALS.

IT has been my good fortune to perform so far extirpation of a diseased kidney six times (from October, 1890, to October, 1891), and not to have lost any of the patients. They are all in good health to-day and enjoy life. To go here over their histories would lead me too far, although every one of them contains some points of interest. One of the six cases, however, is so comparatively rare, and the result of prompt operative interference so extremely gratifying, that I think it worthy to be reported.

Miss R. G., 28 years of age, had always been healthy until 1890, when she was seized with a full, oppressing feeling and some pain in her right hypochondriac region. The pain increased for about two hours, then it suddenly ceased. Similar attacks recurred at intervals of six to eight weeks. She consulted her family physician, Dr. A. M. Lesser, of New York city; but the most careful examination failed to detect anything abnormal. There was no fever, fæces were colored, urine normal. In December, 1890, a similar attack set in; this time, however, with considerable rise of temperature and general distress. Patient had to stay in bed for nearly one week. This time a small tumor could be felt below the border of the right ribs and close to the outer border of the right rectus muscle. It suddenly disappeared on the fifth day, leaving no trace behind. It could not be made out whether during these attacks the secretion of urine had been scarce, and whether coincident with the sudden improvement

[1] Read before the Medical Society of the State of New York at its eighty-sixth annual meeting, Albany, February 2, 1892.

an abnormally large amount had been voided. The patient felt entirely well for nearly four weeks, when the trouble recurred in a more serious form for the third time, also with considerable fever, local, great sensitiveness and general malaise. An eminent physician was called in for consultation, who diagnosticated cholelithiasis, and advised, in view of the frequently recurring attacks, operative interference. When I saw the patient with Dr. Lesser, on January 30, 1891, I could not but concur with the two gentlemen's diagnosis. There was a tumor of about the size of a fist palpable below the border of the right ribs, between the anterior axillary and the median line, the greatest prominence corresponding to the outer border of the right rectus muscle. At this spot the hand, gently placed upon the abdominal wall, felt a soft crepitation, and created pain on pressure. Gentle bimanual palpation seemed to reveal a movable growth, which reached so close to the surface, however, and was so prominent anteriorly, also left the lumbar region of the same side so comparatively flat, that it did not impress me at all as being of renal origin. Moreover, the patient had a yellowish-pale color and the urine was normal. I therefore abstained from inflating the colon or tapping the tumor, and was also inclined to attribute the symptoms to cholelithiasis, with one or more gall stones impacted in the cystic duct, which did not entirely block its lumen. Only now and then, so I calculated, did such stones entirely occlude the duct, and then the occlusion was due less to the size of the stone than to active contraction of the muscular coat of the duct around it. I advised the continuance of the treatment—small doses of morphine and ice-bag—and operation as soon as the inflammatory symptoms should have subsided. Twelve days later Dr. L. called on me, stating that the pain and fever had lessened, the size of the swelling was not materially increased, and that the patient was now ready for the operation for biliary calculus. I did not see the patient again until the day of the operation—February 12th—when bimanual palpation of the patient for the first time under ether led me to modify my original diagnosis, for now the tumor rather seemed to originate from the kidney than from the gall-bladder. Still, I opened the abdomen outside of the rectus muscle, and was not greatly surprised to find that the tumor was really retro-peritoneal. The prerenal peritoneal fold was greatly hyperæmic, but there were no adhesions. The wound was sewed up at once with silk-worm gut. Two sutures in the middle of the incision, which corresponded to the greatest convexity of the tumor, had to be very snugly tied in order to bring the divided tissues into proper apposition. I purposely did not add a retro-peritoneal operation at once, as nephrectomy, not

only nephrotomy, might be indicated. And for this I wanted the patient to be properly prepared. I also wanted to perform cystoscopy first, in order to determine the excreting power of the other kidney. For if my aspirator should draw a transparent fluid from the swelling simple inspection of the urine would not suffice to enable me to estimate the condition of the companion gland. If, however, pus should be found cystoscopy would not be necessary, for I could at once infer that the opposite kidney was in good working order and excreting all the urine that was passed; for this was perfectly clear, which fact would point to an occlusion of the right ureter, preventing any descent of fluid from a purulent kidney.

Temperature was slightly raised in the first two days after the initial operation but did not exceed 100.5. Otherwise no reaction followed. The patient only complained of some pain in the line of incision. Stitches were removed on the eighth day, when the wound had healed by primary union throughout.

Twelve days later Dr. L. notified me that the middle of the wound had reopened and gave a continuous exit to a large amount of flocculent pus. Evidently the two silk worm gut sutures in the middle of the wound, which could only be tied with some difficulty at the time of the operation, had made a local pressure necrosis on the sac which, once started, was rendered complete by the presence of purulent fluid in the renal tumor. Meanwhile adhesions had formed within the prerenal fold, so that none of the pus entered the peritoneal cavity. No drainage tube was introduced. The wound was loosely covered with an antiseptic moist gauze dressing. As the symptoms due to distension of the kidney were now relieved by this spontaneous perforation of the sac, there was no urgency for immediate interference, and we used the next weeks to build up the patient. Cystoscopy was not now needed to test the functions of the opposite kidney, as all the secretions of the diseased gland passed through the fistulous opening in the abdomen, and the clear urine which continued to pass per urethram in normal quantity and quality, was evidently secreted by the kidney of the opposite side.

On March 19 nephrectomy was done with the help of an incision parallel to the border of the twelfth rib, to which later a short second one, passing from nearly its middle at right-angles, was added. I nicely succeeded in pealing off the sac from the opening in the abdominal wall as well as from the perirenal peritoneum which appeared extremely thin over the whole area. Then the ureter was first divided separately. As usual, this greatly facilitated the tieing of the renal vessels, which was done with strong silk. The ligature was left long.

The kidney presented a number of cavities which were filled with thin purulent fluid, intermingled with thick flocculent coagulated material and peculiar round, semi-solid masses which impressed me as the organic skeleton of beginning stones which were not yet hardened by the deposit of salts. The pelvis of the kidney and the ureter were found to be filled with the same material. The latter was flushed out by irrigation as much as possible, yet a thin, soft rubber-bougie could not be pushed down into the bladder. Nor did I succeed in throwing warm boric water through the ureter by means of a hand syringe, although a good deal of pressure was used. After proper disinfection the cut in the muscles was closed by a number of cat-gut sutures, and the greatest part of the outer wound sewed up. A small drain was introduced through the abdominal fistula and the large irregular wound loosely packed with iodoform gauze. The patient stood the operation very nicely. Temperature and pulse remained normal. From the second day on she passed the normal amount of urine, which was as clear as before. The silk ligature which tied the pedicle was extracted four weeks after the operation. Recovery was progressing very favorably, the patient was already sitting up receiving company, etc., when on Sunday, April 26th, 38 days after the operation, and on the day menstruation was due, which however failed to set in, a short while after a normal micturition she felt a sudden dull pain in the "left" lumbar region, with an urgent desire to urinate. She tried to do so, but could not pass one drop. She waited a few minutes, and then tried again; not a drop. The doctor was sent for. He at once introduced a soft rubber-catheter. The bladder was empty. Hot drinks and digitalis were ordered. A restless night was passed, especially disturbed by the continuous lumbar pain. At an early visit on the next morning catheterization was again practiced. The bladder was still empty. Now the doctor conveyed the tidings to me. There was no doubt in my mind that the sudden absolute anuria was due to blocking of the ureter of the remaining kidney by some mechanical obstruction. I saw the patient at once. She was greatly depressed, as she was perfectly conscious, and being an intelligent person, understood what was at stake. We agreed to wait a short time, and in the meantime see whether we could with the help of very strong heart-stimulants, diuretic drugs, and the introduction of a large amount of fluid, increase the secretion of urine sufficiently to overcome the obstacle in the ureter. If we did not succeed nephrotomy would be necessary. To aid in the elimination of urea from the system cathartics were ordered. But as was feared would be the case, the anuria continued. Not one drop passed the blockade. Moreover, the lumbar pain increased, the pulse

became somewhat slower. Patient vomited once. On Wednesday, April 29th, at noon, 2½ days after the onset of the symptoms, I made the lumbar incision, with the patient in Lange's position.[1] As soon as the quadratus lumborum muscle had been divided a marked oedema of the subjacent tissues was noted. The perirenal adipose capsule was bluntly separated and the purplish red kidney appeared. It was not materially enlarged, but dense to the touch. A concrement could not be palpated nor did a needle plunged into the pelvis and the renal tissue at different points strike one. It was interesting however, to watch the many small fountains of arterial blood which were ejected out of every puncture-hole, synchronously with the pulse. I allowed these to spurt for a short while and thus reduce the immense arterial hyperæmia of the organ before I had them compressed. I now was obliged to add two short transverse incisions to the original longitudinal one, starting from both ends of the latter at a right-angle and penetrating the entire thickness of the erector trunci and sacro-lumbalis muscle (Bardenheuer's Thuerfluegelschnitt), in order to fully expose the upper portion of the ureter. Then the latter was longitudinally incised with a knife as low down as possible with the hope to be better enabled to extract a stone which might have become impacted in its course. As soon as the ureteral canal had been opened a mass of seropus, large shreds and coagulated pus and blood escaped. The same material absolutely corked the ureter for a distance of at least two inches. A thick probe pushed down with some force entered for perhaps one-half inch but then was stopped. It did not strike a stone. Evidently an abscess previously encapsulated in one of the pyramids had perforated into the pelvis of the kidney. A thin Nelaton-catheter was now introduced into the ureter downward alongside its wall, which was stretched with the help of two mouse-tooth forceps, and through it warm boric water forcibly injected by means of a hand syringe. Thus I succeeded, little by little, in washing out the debris backward towards the pelvis of the kidney. When the injected water returned clear the lower end of the catheter was cut off obliquely and pushed towards the bladder as far as possible and a number of syringes full of water flushed down into that viscus which had not been distended by a natural flow since three days. The patency of the ureter was thus re-established. That not the slightest obstacle was any more in the way of a normal kidney drainage was proved by a rubber-bougie which corresponded to the ureteral caliber and was passed down into the bladder in its entire length without any resistance. To guard as much

[1] ANNALS OF SURGERY, 1885. Vol. II., p. 286.

as possible against a return of this deadly occurrence, the wound in the ureter was still enlarged in an upward direction, thus dividing the pelvis of the kidney. The latter was found not to be materially enlarged but filled with the same material as the ureter had been. It was rapidly cleared by gentle irrigation. A curved steel-sound then introduced into the different calices failed to touch a stone. I was satisfied that the obstacle had been successfully removed. Now the wound was loosely filled with iodoform gauze, the rectangular skin muscle flap turned back and fastened to the opposite border by a few silk worm gut sutures which were again loosely tied. The incision in the pelvis of the kidney and the ureter had, of course, been left open.

The immediate as well as the remote result of this operation was gratifying in the extreme. The kidney at once resumed its work. At the evening of the operation dressing and bed covers were soaked with urine, on the second and third day somewhat less, as a great part of urine entered the bladder again and was voided per urethram. The gauze-tampon had no doubt become adherent to the wound of pelvis and ureter, and thus forced the urine to pass the natural passages. It was very tempting to leave the gauze in place for six or eight days, meanwhile allowing the wound in pelvis and ureter to heal by primary union. But after some deliberation it seemed better to me rather to adopt a slower but safer method. I extracted the gauze after three times twenty-four hours, to the great displeasure of the patient, as nearly the whole amount of urine at once made its way through the lumbar incision. Nevertheless the wound healed without any special reaction. A renal fistula established itself in the upper and lower right angle. These two fistulae were slowly drying up, towards the end of the fourth week after the operation, when the correctness of the after-treatment was clearly demonstrated.

One day before the next menstruation was due the urine, which had been clear and had for the most part passed the bladder, again suddenly made its exit through the lumbar opening in its entire quantity. Temperature rose to 101, pulse rate to 130. The catheter drew a few drops of heavily turbid water from the vesical cavity, but only once. Later on it was found empty. The former accident had recurred! A thin English catheter, bent according to the probable shape of the upper urinary passages, could be pushed in for several inches, and drew urine mixed with shreds. But at a certain distance it was stopped. Water injected through it returned murky. I deemed it to be the wisest to abstain from any further irrigation for the time being, as I could not see what I was doing and as the artificial safety-

valve guarded against a return of the anuria. I also thought it best to abstain, for that time at least, from trying to push a thin rubber bougie or catheter through the vesical mouth of and into the left ureter with the help of Boisseau du Rocher's cystoscope. I trusted in nature and time to dissolve the coagulated mass in the ureter and thus restore the former hopeful condition. But it took nature a good time to fulfill this hope. For eight weeks the kidney found its drain through the lumbar fistula. The patient was continuously wet and extremely annoyed and despondent, although large pads of moss nicely absorbed the fluid.

As the prognosis with reference to restoration of the normal flow of the urine was extremely uncertain, I designed a renal urinal, (Fig. 1.) in the shape of a "bustle" as worn by the ladies a few years ago. A soft rubber-catheter, which drains the pelvis of the kidney and

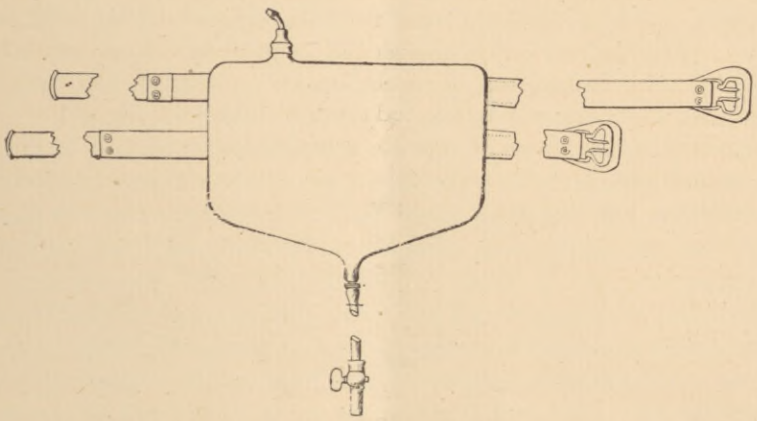

Figure 1.

fits water-tight in the fistula, enters the bag at its upper end in such a way that it conveys the urine into it, but, by means of a valve prevents it from returning through its channel, if the patient should lean back in a chair for instance and thus compress the partially filled bag. A long tube with a stop-cock at its end is given off from the lower end of the bag and passing between the legs of the patient is fastened at some convenient spot in front. (Fig. 2.) I have no doubt that this mechanism would have worked nicely. Happily we had no chance to use it, in this case at least, as in the seventh week, after the last clogging, a worm-like shred, 4 inches long, of a grayish-white color and the size of theureter was expelled out of the latter's vesical opening and sud-

denly passed with a larger amount of urine, to the greatest delight of the patient. It took only a few days to dry out the upper fistula, but no persuasion from our side was needed to induce the patient to leave a drainage tube there in situ. It was no easy task to retain it in place. However it was forced to do so, and worn for nearly six months, although no urine ever passed it. The wound in the pelvis of the kidney had cicatrized, and the tube led down to it as a guide. Seven weeks ago, on December 12th, it slipped out by chance and could not be reintroduced on the following day.

To-day the wound is firmly closed and the patient in the best of health. She passes a normal amount of clear urine [1] and has no trouble whatever. Of course she is kept and keeps herself under close medical observation.

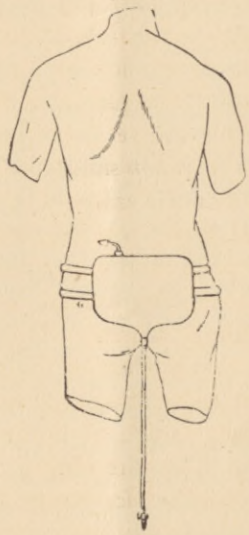

Figure 2.

This case presents a number of interesting points:[2]

First, the strict indication for nephrotomy in a case of sudden anuria which occurs some time after nephrectomy and a period of uninterrupted recovery with the secretion of a

[1] I should mention that some turbidity of the urine was greatly improved during the latter part of last year by the administration of methyl-blue three times a day, 1⅔ gr. in capsule. Cfr. M. Einhorn, N. Y. Med. Record, 1891. Vol 40, p. 643.

[2] I want to emphasize at this spot that in my following remarks I exclude all reference to *tubercular disease* of the kidneys.

satisfactory amount of urine. I should rather add the word "absolute" to sudden, as I have seen in my third case of nephrectomy that if the ureteral canal is not entirely blocked, the vis medicatrix naturæ can itself effect a cure. In that case cystoscopy, performed before nephrectomy, had demonstrated prolapse of the ureter on the other side and had therewith established the diagnosis of an irritative process in the remaining kidney, probably its pelvis.[1] On the thirty-ninth day after the operation, and after an equally long time of perfect comfort and undisturbed recovery, an abundant haematuria set in. But the blood and coagula, with a very scarce amount of urine, were voided per urethram; there was no "absolute" anuria. On the sixth day after the onset of this at times extremely critical trouble, the patient passed a stone, which at once put a pleasant conclusion to all further ailing. Only the very weak condition of the patient at that time prevented me from using the knife. Of course, I am now glad of this.

The answer *which operation* should be performed in such a case of sudden absolute anuria can only be the one—*Nephrotomy*. It will be best done in Lange's position, with an incision that permits free access to the pelvis and upper portion of the ureter for hands and eyes (lumbar longitudinal or angular incision or Bardenheuer's Thuerfluegelschnitt). Only if the obstruction would not be found at that portion of the urinary tract, certainly an exception, Bardenheuer's extra peritoneal exploratory incision or the incision of James Israel, of Berlin, proposed for a free access to the ureter in its entire length,[2] should be resorted to besides and the cause searched for alongside the lower portion of the ureter.[3] We undoubtedly have a right to go ahead in this way in view of the certain death of the patient if no relief is obtained.

[1] Cfr. Author. The progress of cystoscopy in the last three years.—*N. Y. Med. Journal.* 1892. p. 173 and 174.

[2] *Ueber Nephrolithomie bei Anurie durch Nierensteineinklemmung; zugleich ein Beitrag zur Frage der reflektorischen Anurie.—Deutsche Med. Worchenschrift.* 1888. p. 7. This incision begins at the anterior border of the sacrolumbalis muscle and runs parallel to and about one inch apart from the twelfth rib to the latter's anterior end. From there it is carried obliquely downward near to the middle of Poupart's ligament, where it turns to the middle line and ends at the outer border of the rectus muscle. The incision also is extraperitoneal.

[3] Cfr. A T. Cabot. A succcessful case of uretero-lithotomy for an impacted calculus. *Boston Medical and Surgical Journal.* 1890, p. 247.

A further interesting point is the coincidence of the repeated blockings of the ureter with the time of the menstruation. No better proof could be given of the great influence exercised by menstruation upon all the abdominal viscera, especially the kidneys, and above all upon the left kidney, owing, perhaps, besides the nervous connections, which are common to both, to its close vascular connection with the left ovary through the ovarian vein. It is well known that the left ovarian vein generally empties into the renal vein, whereas the right ovarian vein empties into the vena cava.[1]

There are a great many more interesting points in the history of this case which might be discussed here. But it would lead me too far in view of the limited time given me to-day. I only should still like to state that as far as a careful perusal of the literature has shown me, this is the second case on record where nephrotomy successfully cured sudden absolute anuria occurring some time after previous nephrectomy on the other side, and the fourth where total suppression of urine setting in

[1]The possible dependence of these renal accidents upon the peculiar anatomical relations of the left ovarian vein was suggested to me by Dr. Mary P. Jacobi. Cf. F. Hyeth. Text-book on Anatomy, Vienna, 1875, p. 949; Lusk's System of Midwifery, p. 25.) The greater frequency of hyperæmia of the left kidney has also been attributed to the fact that the left renal vein will at times pass behind the aorta. There evidently occurs an excessive hyperæmia in the remaining kidney also immediately after nephrectomy. Its presence is demonstrated by the sudden change in the transparency of the urine if that remaining kidney had already been slightly affected. I have seen that in two of my cases, and could not explain the phenomenon in a different way. Certainly it has been observed by many who have done several nephrectomies that in a number of cases immediately after the one unhealthy kidney has been removed the urine which descends from its, probably only slightly affected, fellow, and which had formerly been found comparatively *clear*—with the help of cystoscopy, or after nephrotomy on the other side had been done—suddenly becomes very turbid, and presents an unusually heavy deposit after short standing. As I have seen it can take weeks or months before this turbidity lessens or disappears. In the majority of cases it does so, however, but slowly and gradually.

Schede (*Meine Erfahrungen ueber Nieren exstirpationen. Separatabdruck aus der Festschrift zur Eræffnung des Krankenhauses*, Hamburg, 1889, p. 45, foot-note) also mentions this necessarily present, suddenly increased arterial pressure in the remaining kidney after nephrectomy on the opposite side. He is inclined to look at it as the probable cause of the acute epithelial necrosis ("Coagulations-Nekrose") in the tubuli contorti of I and II order of the kidney, which has been found in a few instances after nephrectomy on microscopical examination of the remaining kidney, and to which the immediate fatal result of the operation evidently was due.

some time after an operation on one diseased and later useless kidney (nephrectomy or nephrotomy) and evidently due to an occlusion of the ureter of its fellow, has been overcome by attacking this remaining gland, which alone attended to the secretion of urine.

On January 3, 1882, B. Bardenheuer of Koeln, Germany,[1] had opened a pyonephrosis on the left side in an unmarried lady twenty-seven years of age by the lumbar incision. The abcess was soon closing up and patient doing well; only a very scarce amount of clear urine was voided through the wound. On February 8, the thirty-sixth day after the operation, a sudden chill with total suppression of urine set in. The catheter found in the bladder only some mucus and a small stone. Pain in the back and the right lumbar region running down towards the bladder; nausea. On the following day the high fever, pain and absolute anuria continued; patient had twice vomited some greenish mucus. February 9, operation: Lumbar incision on the right side with an additional transverse cut at its lower end which runs backward. The kidney was shelled out of its adipose capsule. When this had been anteriorily done the finger reached the pelvis of the kidney and the upper end of the ureter. A small stone could be felt in the latter, which by palpation suddenly slipped back into the pelvis of the kidney. At the same moment a stream of urine was expelled through the urethra. The communication between kidney and bladder had been re-established. Now the stone was pressed back with two fingers of the left hand into the ureter, the latter incised with a knife, and a smooth longitudinal concrement of the size of a bean extracted. Four more small stones were removed from the renal pelvis. The wound in the ureter was closed by three silk-sutures, and the large wound loosely packed with antiseptic gauze. Soon afterwards the urine made its way through the wound. On the fourth day after the operation chill and recurrent anuria. In narcosis the upper portion of the ureter is bluntly loosened for some distance, divided, and fastened in the lumbar wound. On March 12, the patient is without fever and slowly recovering.

[1] O. Thelen, Nephrolithotomie wegen Anurie. Centralblatt fur Chirurgie, 1882, No. 12.

In 1885, R. Clement Lucas, of London,[1] performed nephrolithotomy (following nephrectomy) for total suppression of urine on a female patient, thirty-six years of age. There was a strong family history of consumption. For seventeen years she had suffered from hæmaturia at intervals, and for nine or ten years this had been accompanied with pains on the right side of the abdomen; for seven years a tumor diagnosed as a floating kidney had been felt on this side. On July 14 nephrectomy was done for stone kidney on the right side. Uninterrupted recovery. On October 24, three and a half months after the operation, the patient was suddenly seized with most violent and agonizing pains in her back and left loin. The pain passed through the loin to the front of the abdomen and groin. She passed a little urine, but then all secretion stopped. Vomiting commenced soon, and was continued at intervals and whenever anything was taken. On the fifth day of anuria the patient became drowsy and weak, so that it was difficult to rouse her to obtain answers to questions. The pelvis of the left (remaining) kidney was opened and a conical stone extracted which had acted as a ball-valve to the top of the ureter. It was more than three-fourths of an inch in length and from three-eighths to five-eighths in diameter. Urine began to drop at once out of the wound as soon as the pelvis of the kidney was opened, but the pelvis was not found much dilated. For twelve days all urine was passed by the wound in the loin. Then one and a half ounce was passed with great pain from the bladder, and the quantity gradually increased. After the ninth day all the urine was voided by the natural passages. Ten weeks after the operation healing was complete. Five years later the patient was still living and enjoying the best of health.

In 1886 F. Lange, of New York City, reported a case of total suppression of urine in a man thirty years of age, which occurred eight weeks after nephrotomy on the left side had been performed for pyonephrosis and multiple stone, on October 2.[2] The first kidney, or, rather, the wall of the pyonephrotic sac, had

[1] On a case of nephrolithotomy (following nephrectomy) for total suppression of urine lasting five days; complete recovery and good health five years after the operation.—*Proceedings of the Royal Med. and Chirg. Society, 1890.*

[2] Two cases of renal surgery. *The Medical News.* 1886. p. 69.

to be left in place at that time. After a few weeks the discharge from the existing fistula was moderate, apparently very little admixture of urine. About November 25th patient commenced to complain of pain in the abdomen. Urine became scanty. Three days later only a few drops could be withdrawn from the bladder. Nothing had been passed within the last twenty-four hours. On the morning of the 29th abdomen tympanitic, very painful; principal pain, however, was located in the right side, while the first operation had been done on the left. Pulse weak; dyspnoea; beginning collapse. Not a drop of urine in the bladder. Occlusion of the right ureter was diagnosticated and nephrotomy at once done on this side. The fat from the posterior aspect of the kidney having been removed, an abscess was found in its substance and quite near the insertion of the pelvis. It was near perforation. Being opened, the finger passed without resistance into the pelvis. In withdrawing it a great quantity of bloody urine escaped. A long, slender, thin-bladed dressing forceps pushed into the first part of the ureter soon met with a resistance without having the touch of a stone. The obstruction was found to be a whitish-gray plug, about the size of the end phalanx of the small finger, somewhat flattened and conical, resistant but brittle and apparently consisting of an old fibrinous clot, into which watery substance and numerous gravel-like concretions were imbedded. It was washed out by means of a hand syringe. On the first day after the operation three quarts of a cloudy, slightly bloody urine had been discharged. Almost all the urine seemed to pass by the normal channel. The patient made an uninterrupted recovery. He is, as Dr. Lange kindly informed me, still living and able to work. He has a fistula in his left loin, which only discharges a few drops of pus, no urine, and probably leads down to remnants of stone. The fact that during the occlusion of the right ureter no urine was found in the bladder is conclusive proof that the left kidney had already at that time entirely lost its significance as a urine secreting organ.

Two questions are still strongly presenting themselves to the mind of the careful observer:

1. Is not the suppression of urine in a few of those happily rare cases where fatal, absolute anuria sets in and continues "immediately" after nephrectomy, also due to a similar mechanical

cause, provided the cystoscope had previously demonstrated the existence of a working kidney on the side opposite to the seat of disease?

It is well known that a number of deaths caused by acute uraemia after the removal of one kidney have been reported. If a thorough postmortem examination was not made or could not be obtained, they were mostly explained as due to a nervous reflex-anuria.[1]

2. If this sudden total suppression of urine sets in and continues "immediately" after the removal of one kidney in cases where,

a. the retroperitoneal incision had been made,

b. strong antiseptic solutions (sublimate and carbolic) were not used in the wound,

c. shock and great loss of blood had not been present at the time of nor after the operation,

d. the cystoscope had shown a well working kidney on the opposite side before the operation, and

e. strong and continuous stimulation failed to work;

And if then a deep and protracted chloroform-narcosis does not restore the renal function, thus making a nervous (reflex) origin of the anuria improbable:[2]

Is not nephrotomy on the remaining side then indicated?

If nothing is done the patient will certainly die; if an obstruction is found and removed, there is hope for recovery.

But suppose no mechanical obstacle were found in the pelvis of the kidney nor in the ureter!

Then an artificial direct depletion of the organ could perhaps still prove useful. It would reduce the hyperæmia, which fol-

[1] That such a nervous reflex-anuria, dependent upon a mechanical irritation on the one side, really exists, is nicely demonstrated by the case of James Israel, Deutsche Med. Wochenschrift, 1., c. Man, 49 y., suffering for years from gout and right renal colic. November 15, 1886, left renal colic; Nov. 16, total suppression of urine. Nov. 21, lumbar incision on the left side. Stone found in the pelvis iof the kidney, entering and occluding the ureter; extracted. A second stone is mpacted in the ureter, 10 centim. lower down. It is pushed up into the renal pelvis with two fingers from outside of the ureteral canal, and then extracted through the same wound. Both kidneys at once resume their work, as could be proved by the different result of qualitative analysis of that urine which passed the bladder and that which was discharged through the wound.

[2] J Israel, !. c., p. 6.

lowed in the remaining kidney upon the ligature of the renal blood vessels on the operated side.[1] (If the acute coagulation-necrosis of the epithelial cells in the tubuli contorti has taken place such a procedure will be useless. Still the puncture and direct depletion will not aggravate the trouble).

As far as I could ascertain, nephrotomy on the remaining side has never been performed yet in cases of this kind.

I then would not let a patient of this kind die without having tried with the knife to save his life. If there were the slightest hope that the patient could stand further operative interference I would cut down on the kidney and satisfy myself whether drainage from the kidney were free. And if everything there would be found in normal shape I would puncture the kidney in many different spots with a needle, allowing the small wounds to bleed freely. I would then only losely pack the wound and take every care to avoid pressure from outside.

Reviewing this case,[2] the following conclusions may perhaps with propriety be drawn:

1. Before nephrectomy cystoscopy should, if possible, be performed to prove the presence of a working opposite kidney.

This will be generally unnecessary, if a renal fistula exists on the diseased side and the urine, voided per urethram, is clear and sufficient in quantity. But even in these cases cystoscopy will be a desirable procedure for making a more definite prognosis.

2. If the cystoscope had demonstrated the presence of a working opposite kidney, and if then absolute anuria suddenly sets in some time after nephrectomy and a period of uninterrupted recovery with the secretion of a satisfactory amount of urine, the cause must be a mechanical one. Nephrotomy on the

[1] Of course any increase in the renal arterial pressure will, under ordinary circumstances, increase the secretion of urine. But may not the sudden *excessive* hyperaemia enlarge the arterial capillaries in the glomeruli to such an extent as to compress the vas efferens, which begins in the centre of the glomerulus? The scarce amount of urine in the first one to two times, twenty-four hours after every nephrectomy, could be in part dependent upon this condition. The organism generally quickly regulates such circulatory disturbances. For different reasons it may now and then be unable to do so.

[2] And with reference to conclusions 3, 4 and 5 also reviewing my other five cases of nephrectomy.

remaining side is then indicated as the only means to save the patient's life.

3. Immediately after nephrectomy there is, in all probability, an acute hyperæmia of the opposite kidney. This hyperæmia also frequently occurs in the female sex, especially in the left kidney, at the time of the menstrual period, but probably to a much less extent.

4. Such hyperæmia may suddenly increase an incipient or hitherto entirely latent disease in this remaining kidney. It can even cause the perforation into the pelvis of the kidney of an abscess previously encapsulated in one of the pyramids.

5. Such an aggravation of disease in the remaining kidney may be repeated at a number of menstruations, but is, in the majority of cases, of a passing, not of a permanent character. After such attacks (cf 4) the remaining kidney often shows an improved condition.