Original Articles.

OBSERVATIONS UPON ACQUIRED HYDRONEPHROSIS.¹

BY A. T. CABOT, A.M., M.D.,
Surgeon to the Massachusetts General Hospital.

ANY obstruction in the urinary passages between the kidney and the outer air may cause an accumulation of urine in the renal pelvis and lead to a hydronephrosis. It is with the obstructions in the upper part of the ureter due to some acquired mechanical disarrangement of that tube that this paper has to do.

Whether these acquired, non-congenital cases of hydronephrosis are due in any part to congenital malformation or malposition of the ureter is a matter which in most cases must remain in doubt. For when these cases come to autopsy the acquired changes due to the pressure and displacement of parts by the great accumulation of fluid, mask and make doubtful the original condition.

Two forms of obstruction are found in these cases. These are valvular folds at the entrance of the ureter; and contortions of this tube in the first part of its course which favor the kinking and closure of it when the heavy kidney presses down upon it.

Taking first the valvular folds at the ureteral orifice: their etiology is somewhat doubtful. Virchow regarded the condition to be consequent upon a congenital oblique insertion of the ureter in the pelvis, while Simon thought that this slanting insertion was an acquired condition due to the stretching of the pelvis and the pressure of it down towards the ureter. Küster believed that an inflammatory swelling of the pelvic mucosa was necessary to assist Simon's displacement in forming a valve. He thought that the swollen mucous membrane was shifted somewhat on the submucosa and so partly pushed over the ureteral orifice.

Hanseman explains the valve formation by the pull of the kidney upon the comparatively immovable upper part of the ureter. It is plain that if this part of the ureter is fixed, as Englisch asserts, and the kidney then sags downward it carries the ureteral opening with it and produces a valvular condition such as is seen diagrammatically in the cut, at *b*.

This explanation seems applicable and satisfactory in many of the cases, and accounts for the not infrequent association of hydronephrosis with mobility of the kidney.

It also helps us to understand those instances in which by change of position an escape of the retained fluid is brought about. As the valve is usually formed by the falling of the kidney downward, Hanseman recommends raising the hips of the patient in order to correct the condition. It is, however, to be remembered that the displacement of the ureteral orifice may be upwards or to either side if the pelvis dilates unequally in different parts, and in this case some other than the inverted position may straighten the orifice. He saw one case at autopsy in which a hydronephrotic kidney had the orifice so displaced upward that it was only made patent when the pelvis contained considerable fluid and so dragged the kidney down by its weight. This condition was tested by the injection of varying quantities of water and it

was found that a certain amount of distention of the pelvis was necessary to alter the orifice so as to allow of the escape of fluid through it.

The effect of position in relieving such mechanical obstructions may also be helped by kneading and moving the tumor about, and in these ways relief may sometimes be obtained in those cases of intermittent hydronephrosis where the valve is not a very perfect one.

The hydronephrosis sometimes owes its origin to some temporary condition, as for instance, to the stopping of the ureter by a blood-clot, by an inflammatory swelling or by other pressure from without. If, now, this temporary cause is removed, the weight of the hydronephrotic sac may then be sufficient to keep up the obstruction by maintaining the valvular condition by the downward pull of the kidney. Under these circumstances a very thorough aspiration, by relieving the weight, may suffice to correct the condition, and, indeed, a certain number of cures are obtained in this way.

a. Diagram of normal condition.

b. Diagram showing change produced when the kidney sags and carries the urethral orifice downward.

Drainage of the sac through an incision in the loin is a more efficient means of treatment in such cases, for the constant escape of the fluid gives the sac an opportunity to shrink up and resume its more natural contour. Moreover, the nephrotomy gives the opportunity of drawing the kidney up to the loin and fixing it there, thus preventing any further sagging down.

In this way cures have been obtained and the following operators have been fortunate with this method, more or less perfectly carried out: Weir,² Peters,³ Tuckwell,⁴ Cabot.⁵

The disadvantage of this method of operating is, that, in case the obstruction for any reason remains, the patient is annoyed by a persistent urinary fistula. With the fear of this result in view and the valvular nature of the obstruction being recognized, it is natural that attempts should be made to obviate it by direct surgical correction of it. Unsuccessful attempts to relieve the valve at the entrance to the ureter were made by Simon⁶ prior to 1876, by Trendelenburg⁷ in 1890 and by Küster⁸ in 1891. In Simon's and Trendelenburg's operations the ureter was slit up for a considerable distance as it lay alongside the pelvic wall and then an attempt was made to unite the divided borders of the ureter to the lower part of the pelvis. Küster began his operation on the same plan, but finding a stricture, ended by resecting the upper end of the ureter. All of these cases resulted fatally.

¹ New York Medical Record 1880, xvi, 294, and 1882, xxi, 477.

² Loc. cit., 1882, xxi, 477.

³ London Lancet, 1882, ii, 141.

⁴ Boston Medical and Surgical Journal, February 22, 1883.

⁵ Chirurgie d. Nieren, vol. ii, Stuttgart, 1876.

⁶ Virchow's Samml. klin. Vorträge, No. 355.

⁷ Archiv. f. klin. Chirurgie, Bd. xlv, Heft 4, p. 850.

¹ Read before the Surgical Section of the Suffolk District Medical Society, January 8, 1896.

In May, 1892, Fenger⁹ did a successful operation for valve formation by cutting through the fold that made the valve and so applying the sutures as to convert the longitudinal cut into a transverse wound. In this case he left a bougie in the ureter for two days and stitched up the kidney that was movable. Mynter¹⁰ has since done a similar operation, likewise with good result.

These cases are too few to enable us to reach any decision as to whether this is the best way to correct this condition. We must remember the etiology of the valve formation, and must accept the fact that many cases have recovered after a simple nephrotomy with fixation of a movable kidney. We may feel, however, that if a distinct valve formation is found, Fenger's method of division may be practised without adding materially to the danger of the operation, for the chance of infiltration of urine must be slight when the tension is wholly removed by lumbar drainage. These operations are certainly attempts in the right direction for they seek to re-establish the function of the kidney; while a nephrectomy, which is the last resort in these cases, is an unscientific proceeding when it removes an organ still doing good work.

We come now to consider the other form of obstruction due to mobility of the kidney. A tortuous condition of the upper end of the ureter may be associated with a very movable kidney. This happens so often that it is probable that the twisted condition of the ureter is dependent on the mobility of the kidney. Sometimes, too, an obstruction in the lower part of the ureter leads to a dilatation of the upper part of that canal, which in this case becomes tortuous and may lead to an actual torsion. If, now, at any time by twisting or kinking, a retention of urine is caused and leads to an accumulation in the pelvis, the heavy kidney pressing down towards the already twisted ureter aggravates the previously existing condition and produces a permanent stoppage. The point of obstruction in this case may be at some little distance from the pelvis.

Under such circumstances a good result may perhaps be attained by frequent aspirations which, emptying the kidney, allow of a shrinkage of the pelvis and in this way pull up the ureter into place. A nephrotomy, however, offers a much better chance of cure, for by drawing up and fixing the kidney in the loin it tends to straighten the ureter and so to restore its calibre.

If, however, the ureter is so slack and tortuous that its condition does not seem to be remedied in this way, it might even be worth while to resect the upper part of the ureter and, after straightening the tube, to insert its upper end into the pelvis in the manner practised by Küster and recommended for correction of this condition by Tuffier.¹¹ This is, however, an operation difficult of performance and not devoid of danger. As a less dangerous proceeding, the writer would suggest that this tortuous condition can be corrected by inserting a bougie and leaving it *in situ* for several days. In this way the various curves of the canal are effaced while the pelvis is contracting and pulling it into shape. Furthermore, a moderate amount of inflammation is set up in the walls of the ureter which stiffens them, attaches them to the parts about and thus tends to

keep the form given to the tube. The writer has carried out in one case this plan of operating and with so much success that he reports it as a suggestion for future trial. The history of this experience is as follows:

Miss H. M. A., thirty-two years of age, was sent to the Massachusetts General Hospital by Dr. Cooper of Northampton on March 25, 1895, with a cystic tumor of the abdomen. Catamenia had been irregular and rather scanty. For four years, from the time she was twenty-two until she was twenty-six, she suffered a great deal of pain in the right side of the abdomen. Two years ago she first noticed an enlargement in the abdomen a little to the right of the median line, and the past year she has had an increase of the pain, which has been almost constant and is more noticed for a week following the catamenia. She has never noticed any symptoms in connection with urination.

Examination showed that she was thin and pale, of a feeble muscular development. Nothing found in the chest. Examination of the abdomen when lying on the back showed a large, fluctuating mass in the right side extending up under the liver and going well down to the brim of the pelvis. When she stands up, this mass rests across the lower part of the abdomen just above the pelvis, and the region about the neighborhood of the liver is then empty.

The catamenial history had led to the diagnosis of an ovarian cyst, but the position of the tumor when she was on her back strongly suggested a hydronephrotic kidney. The examination of the urine was wholly negative. The great mobility of the tumor made it seem probable that if it were the kidney it must have a long meso-nephron, and there was danger that a puncture in the loin might traverse the peritoneal cavity. We thought it wise, therefore, to explore by an abdominal incision, which was done March 29th.

The tumor was found to be a large hydronephrotic kidney, which was extremely movable as had appeared by previous examination. With the hand in the abdomen guiding the aspiration, a needle was introduced through the loin and the sac entirely emptied. The abdominal wound was then closed. This operation was followed by no reaction, and the patient made a good recovery.

The examination of the fluid drawn gave the following result. It was of a pale, amber color, with a specific gravity of 1.007, and having a slight trace of albumin. The sediment consisted of brown, granular cells with occasional granular and fibrinous cylinders, like renal casts. The examination for urea showed that the fluid contained 1.01 per cent.

For at least a fortnight there was no sign of any re-filling of the cyst, but at the end of that time the tumor began again to be noticeable in the loin. Examination of the urine soon after the operation gave a specific gravity of 1.020, a slight trace of albumin, hyaline and granular casts, with fat adherent in the sediment.

The patient was in a rather feeble condition during her convalescence, with edema of the ankles, which postponed further operative treatment. On May 7th, her condition being then pretty good, the kidney was opened in the loin, and after it was emptied the ureter could be seen emerging from the cyst by a funnel-shaped opening and running in a tortuous course downward towards the pelvis. There was no valvular

⁹ Transactions American Surgical Association, vol. xli, page 142.

¹⁰ Annals of Surgery, December, 1893.

¹¹ Annales des Mal. des Organes Génito-Urinaires, January, 1894.

appearance to the opening of the ureter nor any condition which could be corrected by incision or other alteration of that orifice.

The mechanical condition which had led to the hydronephrosis appeared to be a twisting of the ureter at some point in its tortuous course, that point not being determinable after the sac was emptied and the parts were lax. It being desirable, therefore, to efface, as far as possible, all of these abnormal twists and turns in the ureter, a gum-elastic bougie, about No. 6, French, was introduced and carried with some difficulty down through the ureter until it reached the neighborhood of the bladder. The sac was sewed to the edges of the wound through the muscles with continuous catgut. A drainage-tube was then introduced into the pelvis of the kidney, and the bougie was left *in situ*.

The recovery was rather slow, but, as far as the healing of the wound went, was uneventful. The bougie was removed at the end of three-and-a-half days, and the drainage-tube was out in nineteen days. There was a considerable escape of blood-stained urine through the tube, which was caught in a bottle and examined.

On May 8th the urine from the bladder had a specific gravity of 1.025 and contained an occasional pus cell and hyaline cast of large diameter. Twelve ounces were passed from the bladder, that is, from the left kidney, in this twenty-four hours.

May 11th (four days after operation). The urine draining from the loin had a specific gravity of 1.015, while that from the bladder had a specific gravity of 1.008.

May 13th. The urine draining from the loin and collected in a bottle measured eight ounces, some considerable quantity being lost in the dressings. It was cloudy with pus and blood, while the urine from the bladder was clear.

May 14th. The urine from the right kidney had a specific gravity of 1.010, while that from the left kidney through the bladder had a specific gravity of 1.008.

May 18th. The specific gravity of the fluid from both kidneys was the same, 1.010.

May 21st. The urine from the drain in the kidney contained 0.5 per cent. of urea; that from the bladder contained 1.39 per cent. of urea.

May 26th. The urine ceased to come through the wound, and the urine in the bladder began to contain a little blood and pus.

June 1st. The wound in the side having been drawn together on the previous day, there began to be pain in the abdomen, and on June 2d there was a chill and the temperature went to 105°. There was soon an escape of urine and pus from the wound, and after this all went well. The sinus finally closed on June 21st.

The patient was seen and examined November 30, 1895. She had made a considerable gain in flesh and strength. She reported that in October she had an attack of dull pain in the right side, which lasted a week. The lumbar scar was solid. In the right renal region was an indefinite sense of resistance, but no defined tumor. The abdomen was so thin that any considerable enlargement could have been easily made out.

The examination of the urine at that time showed it to be acid, with a specific gravity of 1.017, and to contain no albumin. The sediment was considerable,

and consisted mainly of vaginal cells and mucus with an occasional small round cell.

This case is interesting, first, because of the considerable degree of activity retained by a kidney so long affected by a very great dilatation. This is shown by the quantity and quality of the urine obtained through the loin, a quantity certainly underestimated owing to the necessary loss in the dressings.

The function of this organ was well worth retaining even had the operation required been as severe as that of nephrectomy. When we take into account the far greater safety of a nephrotomy, the argument in favor of the more conservative method is greatly strengthened. If nephrotomy is done first in these cases, we have the opportunity to do a nephrectomy later if the occasion requires.

The second point of interest is the success which attended the treatment of the ureter. The restoration of permeability of the canal which was accomplished by the bougie and assisted by the fixation of the sac in the loin, seems to have endured for a sufficient time since operation (seven months), to lead to the hope that it may prove permanent.

How far this method may be relied upon in these cases must be shown by the accumulation of experiences. Also, it will be interesting to see whether the valvular obstructions at the renal orifice of the ureter can likewise be corrected in this way.

Dr. Christian Fenger¹² in his published case mentioned above, left a bougie in the upper part of the ureter for two days. This he did "partly with the same object with which we pass a sound through a meatus which we have cut, to prevent healing with restoration of the part cut; partly to keep the narrowest territory (operation territory) dilated during the first twenty-four to forty-eight hours, during the time when hemorrhage might leave a clot around the ureter and compress it."

The experience in my case suggests a question as to how important a rôle the bougie played in bringing about the success of this case of Dr. Fenger's, and we are led to wonder whether, combined with fixation, it would have been efficacious even without the division of the valvular fold. Tuslier reports that he has cured nine cases of intermittent hydronephrosis by fixation of the movable kidney approximately in its normal position. Others have had similar favorable experiences showing that these valvular obstructions are not always difficult to correct.

A STUDY ON THE SURGICAL TREATMENT OF PERFORATION OF GASTRIC ULCERS.¹

BY CHARLES GREENE CUMSTON, B.M.S., M.D.,
Instructor in Clinical Gynecology, Tufts College.

PERFORATION of gastric ulcer is a most fatal accident, the mortality being estimated by Morse at 55 per cent., by Scheurlen at 82 per cent., by Barling at 95 per cent.

This accident occurs, I think, far more frequently

¹ Read before the Surgical Section of the Suffolk District Medical Society, January 8, 1896.

¹² In a private letter Dr. Fenger writes me that he has left a bougie in place in three other cases of combined valve and stricture. In these cases the bougie was left in the upper four to six inches of the ureter for from two to four days. In none of the cases did it do any harm. Encouraged by this experience of Dr. Fenger's, I shall try to keep the bougie in the ureter for more than three days in my next case, in order more certainly to get the desired effect in straightening and establishing the patency of the canal.