the various urinary constituents may be summed up by saying that although alkalis like ammonia, acids such as acetic acid, and acid salts such as acid calcium phosphate, possess haemolytic powers, it is evident that these are not responsible for the phenomenon seen in actively haemolytic urines. The amounts of all these necessary to induce a similar haemolytic effect when added to (a) NaCl 0.85 per cent. solution, or (b) normal urine, being far greater than exist in urines that are found to haemolyze.

My observations during this work yield, as might be expected, different results as regards alkaline and acid haemolytic urines respectively, and must be left for full discussion later. Here I would only call attention to the protective action of sodium bicarbonate.

It was found, in the first place, that normal sodium bicarbonate solution, when added to a haemolytic urine in varying amounts, from 10 to 40 drops per 10 c.cm. of urine, prevented the haemolytic action, and this whether the urine was previously acid or alkaline, more being required in the case of a very powerfully haemolytic acid urine than in a correspondingly powerful alkaline urine. Following this observation, it was discovered that in patients affording a haemolytic acid urine the administration of sodium bicarbonate by the mouth in sufficient dosage caused the haemolytic action of the urine to disappear. This was tried only in a few cases with very powerful haemolytic acid urines, and never in a case with alkaline urine, and although in my few cases the administration seemed to be of clinical value, they are far too few to use as a basis for treatment.

6. The attempts at removing or neutralizing by the various absorbents, precipitants, filtration, etc., and the influence, if any, of the H ion concentration, as well as other studies, will be left for future discussion.

SUMMARY.

1. A phenomenon of fairly constant occurrence in certain morbid states, which apparently has hitherto escaped notice, is here described, namely, the rapid laking of blood corpuscles by the urine.

2. It has never been noted in the urines of normal individuals.

3. The agent causing this haemolysis is left an open question, but there seems no doubt that it is not a normal constituent of the urine.

4. Save in the case of certain strongly haemolytic alkaline urines, of which one drop sometimes causes instant laking of the blood emulsion at room temperature, the haemolytic process requires incubator temperature of 37° C.

5. Sodium bicarbonate definitely influences the reaction *in vitro*, and possibly when administered to patients by mouth.

6. A curious and apparently definite grouping of stable and unstable urines, so far as change of reaction from acid to alkaline is concerned, has been remarked. This group of unstable urines may perhaps be found of prognostic value.

URETERAL CALCULUS: ITS SYMPTOMS AND TREATMENT.

WITH A FEW ILLUSTRATIVE CASES.

BY

DAVID NEWMAN, M.D., F.R.F.P.S.G.,

CONSULTING SURGEON, GLASGOW ROYAL INFIRMARY.

(Continued from p. 561.)

TREATMENT.

Expectant Treatment.

THE treatment must depend upon an exact appreciation of the state of the patient and of the morbid condition present. If there is reason to believe that one ureter only is blocked, and that the kidney on the opposite side is healthy, it is advisable to wait the course of events, as in many instances the obstruction is relieved spontaneously within a short time and no permanent harm results. This is especially to be recommended when there is evidence that the obstruction is incomplete or transitory, or when the patient is suffering little pain and the stone is known to be a small one.

While a stone in the ureter is certainly a source of danger, being liable to cause obstruction and its consequences—sepsis, haematuria, and hydronephrosis—it does not necessarily demand operation. Whenever a stone is suspected, x-ray detection is used, and, as a consequence, we find that a goodly proportion of ureteral stones are evacuated spontaneously. By having an x-ray plate taken from time to time its progress can be watched, care being taken to keep the patient under supervision. At regular intervals a thorough examination must be made, including a cystoscopic inspection, to ascertain that there is no blocking of the ureter. The following case is a good illustration:

CASE V.—*Repeated Attacks of Renal Colic during Nine Months: Descent of Calculus Watched: Ultimately passed per Urethram.*

The history was that of repeated attacks of renal colic, with the passage of gravel on several occasions. With x-ray a stone was discovered in the first instance (January, 1904) at the level of the transverse process of the fourth lumbar vertebra. The patient was examined at intervals of two months, and on September 9th, 1905, an x-ray photograph was taken, when the shadow of stone was found corresponding in position to the union of the lower and middle third of the left ureter—that is to say, well below the brim of the true pelvis. On some earlier examinations the stone was seen much lower down; therefore, was freely movable. On September 10th a cystoscopic examination was made, when the mucous membrane of the bladder was found to be practically normal, but, on account of the enlargement of the middle lobe of the prostate, the examination was difficult. The orifice of the right ureter was normal; that of the left was considerably dilated and the shape of a melon seed. The margins were very slightly thickened, and on the left lip the line of the mouth was obscured by a trickle of blood escaping from it, so that the whole contour was not clearly seen. The line of the ureter was very distinctly marked, and the mucous membrane covering it was pigmented and congested. On September 11th I received a letter from the patient saying that he had passed the stone on the evening of September 10th, and that he "felt alright now," but should I wish him to do so he was willing to undergo another cystoscopic examination.

A second x-ray photograph was taken on September 11th, and failed to show the shadow seen in the first plate, proving that the shadow seen was due to the stone which had been passed. A second cystoscopic examination showed the same appearances as formerly presented, with the addition that close to the middle of the upper lip there was a small submucous haemorrhage, and a similar spot was seen on the margin of the lower lip, but no blood was found escaping from the orifice. The stone passed was the size of a horse bean, but very irregular in shape and distinctly nodulated. It is worthy of remark that the passage of this concretion caused no laceration of the lips of the ureter or other injury recognizable with the cystoscope further than the minute submucous haemorrhages just described.

I have occasionally found that the ureter stones escape soon after a cystoscopic examination, which, I suppose, may be explained by the manipulation inducing a certain amount of muscular contraction or spasm of the muscular fibres of the ureter, which are often greatly hypertrophied in the presence of calculus.

While the patient is under observation attacks of colic may be prevented or relieved. In such cases the use of massage, shampooing, and the application of fomentations sometimes relieves the spasm. Pain may be alleviated during an attack by the administration of anodynes such as morphine, belladonna, and opium, but the latter drug must be employed with great care, as even a small dose may produce alarming effects when there is any interference with the proper action of the kidneys. It is much safer to employ hot fomentations, emollient enemata, and hot baths; should the pain be extreme, it may be necessary to place the patient under the influence of an anaesthetic, which not only has the advantage of relieving the suffering of the patient for the time being, but may also, by abolishing spasm, facilitate the passage of a calculus from the ureter. Under similar circumstances, warm diluents and diuretics have been given with the view of forcing the calculus down by an increased secretion of urine, but probably the beneficial action of these remedies is due more to the power they possess in reducing the irritating qualities of the urine than to any mechanical effect the increased flow of urine may exert. Changes in the position of the patient sometimes give relief from suffering by altering the situation of the stone, by dislodging it from the position where it causes most complete obstruction; in the same way external manipulation in the renal region or along the course of the ureters has been

recommended. If the calculus is known to be close to the bladder, manipulation through the vagina or rectum may immediately relieve the pain by pushing the stone upwards into the dilated portion of the ureter and so allowing the pent-up urine to escape. Unless during the attacks, the patient should not be kept in bed. Large quantities of fluid should be given to increase the excretion of urine and promote the downward passage of the stone.

With careful treatment directed to promote the progress of the stone into the bladder in many cases we have been able to avoid an operation. When one stone has passed successfully from the ureter we must be assured that no others remain. The stone may pass into the bladder and be seen with the cystoscope, but fail to escape. Dilatation of the urethra with a large bougie may facilitate matters, if not it must be removed. If the stone escapes, well and good, but it must be remembered that in other respects the patient is in the same position as he occupied before the calculus showed itself. Another one may form unless precautions are taken.

Operative Treatment.

If the attacks of pain are frequent or severe; if the patient requires to lead an active life and is likely at times to be beyond the reach of an operating surgeon; if there is any evidence of hydronephrosis or of sepsis; if the stone is fixed in one place or is large in size; if there is only one working kidney; if the patient's general health is becoming impaired and the kidney excretion is not efficient, the stone should be removed as early as possible.

When the ureter of the only working kidney is sealed, it is evident that the first point to attain is immediate relief of the obstruction. In most cases there is a short period during which medicinal remedies may be employed, but unless relief is very speedy valuable time must not be wasted in waiting for the action of drugs. The only working ureter is plugged, and the obstruction can be removed by the surgeon, or an artificial exit can be made in the loin so as to provide a channel for the passage of urine. In this way the immediate danger to life may be averted, and later on a careful search can be made for the stone, and a method devised for its removal.

The operative procedure depends upon the position occupied by the stone:

- (a) When the stone is in the upper third of the ureter.
- (b) When the stone is too high up to be felt by the finger, but occupies the middle third of the ureter.
- (c) When the stone is sufficiently low down to be detected by digital examination in the vagina or rectum.

The stone may be removed without opening the peritoneal cavity by any of the following routes:

1. The lumbar route prolonged extraperitoneally.
2. The paraperitoneal route used in exposure of the kidney by stripping the peritoneum from the abdominal parietes.
3. The hypogastric route, opening the bladder above the pubes.
4. The sacral route.
5. The perineal route.
6. The vaginal route.
7. The vesical route.

The extraperitoneal route is the one now almost exclusively employed in exposing the ureter. During the early stages of the operation the position of the patient is similar to that for renal operations, but it is well to have him placed upon his back with the legs flexed and the thighs brought well up over the abdomen while exploring the pelvic portion of the duct.

The lumbo-ilio-inguinal route is the only one to be recommended in the great majority of cases, the exceptions being those in which the calculus is known to be in the pelvic segment of the ureter.

The incision usually employed commences an inch below the last rib at the outer edge of the erector spinae muscle, and extends inwards and downwards in front of the anterior superior iliac spinous process. The distance to which the incision is extended inwards depends upon the necessities of the individual case. If the patient be short and stout the space may be increased by making a T-shaped addition to the above, or by incising a portion of the quadratus lumborum.

When the fascia transversalis has been exposed and divided the colon is seen. It should be retracted and the hand introduced through the wound behind the peritoneum, when the kidney can be felt embedded in its adipose capsule. The soft fat is easily separated from the kidney,

and after the organ has been fully exposed a systematic examination must be made before it is disturbed from its bed. The ureter should be searched, and if a stone be found it may sometimes be pushed up into the pelvis and removed by an incision through the convex border of the kidney; generally this is easily accomplished, as the ureter is dilated above the point of impaction of the stone, but if it be firmly fixed an incision should be made through the wall of the ureter above the level of the stone, and after the calculus has been extracted the incision may be closed by sutures.

If the kidney is diseased and the tissues around it be indurated and adherent, it is very difficult to detect the ureter. Under such circumstances it is necessary to trace the ureter from below upwards, beginning at the point where it passes over the brim of the pelvis, or where it crosses the iliac vessels. In disease it is usually more easily discovered than in health, but on account of prolonged irritation the peritoneum is more firmly adherent to it than under normal conditions. When the duct is

discovered by the forefinger the intestine and the peritoneum should be gently pressed aside with a thin gauze pad held by an assistant, in such a way as to leave the ureter freely in view (Fig. 7). The serous membrane should then be carefully dissected from the duct as far down as may be necessary. Whether to separate the ureter upwards or downwards from the point in view is easily determined by its lumen; the duct is always distended above the point of obstruction.

The pelvic segment can only be seen by extending the incision in the parietes well forwards, but before doing this it is well to pass the forefinger down into the pelvis and explore, and not infrequently, when the obstruction be due to stone, the concretion can be displaced and slipped upwards so as to be brought into view without enlarging the opening.

A difficulty occasionally met with which should be kept in view is the lodgement of the stone in a diverticulum of the ureter, so that while the concretion is not in the lumen of the duct its presence causes distortion of the passage and obstruction to the escape of urine.

In opening the ureter, an oblique incision should be employed rather than a longitudinal one, which is liable to produce diminution in the lumen of the duct by the suturing, while a transverse incision is likely to be followed by a fistula.

When only the pelvic portion of the duct requires to be exposed, the incision through the parietes may be limited.

Fig. 7.—The right ureter exposed in the ilio-inguinal region, and dragged downwards and forwards, so as to be fully seen. With a little manipulation the stone can be slipped up to the most easily exposed segment of the ureter before being removed.

Instead of starting from a point an inch below the last rib, the incision may be made as for tying the common iliac artery, commencing immediately outside the centre of Poupart's ligament, and $1\frac{1}{2}$ in. above it; this incision is carried outwards towards the crest of the ilium, then upwards and slightly inwards. The abdominal muscles are cut through till the fascia transversalis is reached; it is picked up and divided, and the extraperitoneal fat is exposed to view. The peritoneum is then separated, and, with the bowel, is held to one side by an assistant while the surgeon explores the posterior wall of the bladder for the ureters. Owing to the small size and depth of the wound, it is necessary to throw light into it with an electric forehead-lamp or a mirror.

When the ureter is exposed for the removal of a stone, if it be found that the calculus can be displaced from its bed and pressed upwards, the opening in the duct should be made in the dilated ureter well above the point of impaction. By adopting this plan the incision is made through comparatively healthy tissue, whereas if the cut is made directly over the concretion the line of incision passes through unhealthy tissue, the mucous membrane is apt to be eroded, and the walls of the ureter diseased. After the ureter has been opened and the stone removed it is difficult to adjust the edges of the wound in the flaccid duct. To obviate this difficulty in recent operations I have adopted the following plan, which has given perfect results.

Before the incision is made six catgut sutures should be passed through the wall of the ureter parallel to the line of incision, and one-sixth of an inch away from the cut. Three on each side (Fig. 8, *a*, *a'*, *b*, *b'*, *c*, *c'*) pass through the ureter wall outside the mucous membrane. These are used as braces to steady the wall of the ureter while the incision is being made, and to draw the lips of the wound apart (Fig. 9). When the stone is freely

Figs. 8, 9, and 10 illustrate a method of applying strands of gut before the incision is made (Fig. 8), which may be used as braces to keep the wound apart during the operation (Fig. 9) and utilized as sutures later. Fig. 10 shows the suturing of the mucous membrane with a continuous fine catgut. The strands *a*, *a'* are passed parallel to the line of incision, but when used as sutures *a* on the right-hand side is tied to *a'* on the left side and *a'* to *a*, and so on, *b* to *b'* and *b'* to *b*.

movable and well down the ureter the operation is simple, but in actual practice many difficulties are encountered, the more common of which I may illustrate by the following cases:

CASE VI.—Old-standing Calculous Hydronephrosis with Diverticulum in which Calculus usually lodged: When displaced the Stone blocked the Ureter and caused Symptoms: Stone removed by Lumbar Incision: Good Recovery.

The history dated back over a period of twenty years. The patient was the colonel of an Indian cavalry regiment, and consequently lived in the saddle. The first attack of renal colic

came on while playing polo, and lasted for over thirty-six hours. From then till he consulted me he had severe attacks of renal colic, the pain being limited to the right lumbar region; at one period they were frequent, at another time many months passed free from pain. Within the last few years the attacks have been more severe, and always associated with haematuria; these are now brought on by any sudden movement while lying, and the patient says that the only thing that relieves the pain is a cross-country ride. This, he says, is a certain cure, but relief from pain is always followed immediately by a considerable haematuria. A long shadow was seen close to the body of the third lumbar vertebra on the right side.

At the operation, by a lumbar incision, the kidney was found to be hydronephrosed, and very firmly adherent, so that much difficulty was met with in exposing the ureter and pelvis. The stone could be felt in the thick mass of connective tissue, but when the pelvis and dilated ureter were opened the stone could not be reached. It was found, however, in a diverticulum (Fig. 11, *a*) communicating with the upper end of the ureter (*b*) and was removed, but by cause of the adhesions the diverticulum could not be dealt with. The condition found clearly explains the history that while the stone was in the sac and the patient maintained the erect posture the calculus caused no trouble and was not likely to be displaced, but when he suddenly moved in bed, from lying on his left to lying on his right side, the stone was liable to drop out of the diverticulum into the dilated ureter, and so cause obstruction. Jolting on horseback, while it caused bleeding, evidently pitched the stone back into its pouch, and at once relieved the colic, also no doubt the long periods of freedom from pain were due to the calculus remaining at rest in its receptacle outside the ureter.

Another instance of a stone lodged in a diverticulum may be of interest. In this case the pouch is level with the brim of the bony pelvis.

CASE VII.—Renal Colic of Old Standing, becoming lately Less Acute: Haematuria and later Pyuria from Right Kidney: Stone just below Brim of Pelvis: Hydronephrosis: Stone found in Diverticulum, and removed by Ilio-inguinal Incision.

A lady aged 40 years had attacks of renal colic during several years, but no severe pain had been complained of for two years. There is, however, constant dull pain in the right kidney, occasional slight haematuria, and moderate pyuria.

When I first examined the patient in August, 1908, the quantity of pus deposited was moderate. The urine was acid and contained *Bacillus coli*. The temperature was normal and the pulse good, but the general health was poor, and she said that she was becoming weaker. The bladder was normal, but the orifice of the right ureter was dilated. A shadow was found a little below the level of the brim of the pelvis, and the right kidney was considerably enlarged. The left kidney normal. Both kidneys were working well, but all the pus came from the right. On account of the enlargement of the kidney, the pyuria, and the failing health, an operation was advised.

On exposing the ureter, which was easily done by an ilio-inguinal incision, a diverticulum (Fig. 12) was found in which the stone was lodged. The sac was opened, the stone removed, and the diverticulum excised. A curious circumstance was that the lumen of the ureter above the level of the stone was very little greater than normal and suggested the

Fig. 11.—Rare case of diverticulum (*a*) of ureter (*b*) which contained a long finger-shaped stone.

Fig. 12.—Diverticulum at level of brim of pelvis containing a stone. The ureter was not much dilated, but a moderate hydronephrosis developed.

idea that the diverticulum existed prior to the formation of the stone or that the stone had increased in bulk greatly after it had become lodged in the pouch. The opening of the diverticulum (Fig. 12) was much smaller than the stone. The edges of the wound in the ureter were brought together, and the patient made a good recovery.

After the stone has been brought to the opening in the ureter, difficulty may be found in removing it, as, if smooth and rounded, it may repeatedly slip away from the grasp of sequester or dressing forceps. In such cases the writer has used cup-shaped forceps similar to Mackenzie's laryngeal forceps, or a small lithotomy spoon. Again, in cases of phosphatic concretion associated with *Bacillus coli* infection, the stone may be so friable that it breaks into small fragments as soon as it is grasped with forceps. Here again a spoon is useful. After the stone has been removed, the ureter sound should be passed upwards and downwards to make sure that the duct is patent, that all concretions have been removed, and that no stricture remains. The mucous membrane is separated from the outer wall of the ureter so that it may be sutured separately with a continuous fine catgut suture (Figs. 8, 9, and 10). This completed, the sutures used as braces are tied, *a* to *a'*, *a'* to *a'*, *b* to *b'*, *b'* to *b'*, and so on. In some instances the opening in the ureter is so low down that sutures cannot be used (Case IV). Then the wound should be carefully packed with gauze and a free drain established.

The Paraperitoneal Method.

This is carried out in the following way: The patient is placed on his back and an incision is made $\frac{1}{2}$ in. to the outer side of the linea semilunaris, beginning close to the border of the ribs and descending to the anterior superior spinous process of the ilium. The parietes are divided down to the peritoneum, the cavity of which is not opened, but the membrane is separated from the abdominal muscles gently by the hand of the operator and, along with the abdominal contents, is dragged towards the middle line by an assistant. The kidney, with its surrounding fat, is then brought into view and the ureter exposed and examined as described above.

Should the patient be short and stout it may be necessary, in order to gain sufficient room, to make an incision at right angles to the first one, possibly as far as the quadratus lumborum. The advantage of this method is not so evident in operations upon the ureter as when lesions of the kidney require to be dealt with, but it is certainly to be preferred to the transperitoneal route.

When old adhesions have formed the peritoneum is very liable to be torn, and, should this accident occur, the wound must be carefully sutured before the ureter is opened.

The Hypogastric Route.

This has been occasionally employed by the writer for the removal of calculi. If the stone has passed through the muscular wall of the bladder and pushed the mucous membrane in front of it the appearances presented by the cystoscope are liable to be mistaken for those of a tumour. In employing this method the bladder is opened by a suprapubic incision and the intramural segment of the duct is examined with one finger in the bladder, the other in the vagina or the rectum. It may be possible to grasp the impacted body with forceps and by careful manipulation drag it away without making any incision in the vesical wall, but if the stone be too large for this it is well to make a small incision and dilate the ureter with sinus forceps before attempting to extract the calculus.

The Sacral Route.

This method has been employed by Sir Henry Morris⁴ for the removal of a calculus impacted $2\frac{1}{2}$ in. from the orifice of the ureter. He describes the method as follows: "I employed a straight incision parallel with the median line and 1 in. from it, 5 in. in length, commencing about 2 in. above the border of the gluteus maximus muscle, and extending nearly to the transverse level of the anal aperture, but a little behind it. The edges of the gluteus maximus and great sciatic ligament were divided, and the rectum and vagina were pushed towards the opposite side by breaking through the cellulose-fatty tissue between them and the pelvic wall by means of the forefinger and a few touches with the scalpel. In one of these cases the dorsal position, with the haunches well raised on a firm pillow placed beneath the loin, was found to facilitate the identi-

fication, isolation, and removal of the lower end of the ureter; in the other case the patient had to be turned upon her back before it was possible to fix the calculus. This was done by the forefinger in the vagina, and the patient was again placed on her opposite side with her face downwards and the calculus cut down upon and extracted."

The Perineal and the Vaginal Routes.

These routes also are used for the removal of stones impacted close to the bladder.

Ceci has removed a ureteral calculus through the rectum, and Fenwick has employed a perineal incision; removal through the vagina has been employed by Kelly, the writer, and others. In such cases the ureter is dilated above the point of obstruction, so that it can be easily felt with the finger. The patient is placed in the knee-breast position. The bladder is fully distended with air and the posterior wall of the vagina is retracted backwards so as to give a good view of the anterior wall. The stone having been located with the finger, an incision is made through the vesico-vaginal septum between the orifice of the ureter and the cervix, large enough to admit the forefinger. The mucous membrane covering the stone is now incised and the lips of the wound are held apart, and the stone is pressed into the bladder between a finger in the vagina and a finger in the bladder. The use of forceps should be avoided. The ureter being dilated above the level of the stone, the introduction of the forceps is liable to push the calculus upwards, and once it is loosened it is very difficult to get hold of.

Another method may be used without opening the bladder. The ureter and the stone should be fixed by a small sharp hook, and an incision is then made through the vaginal wall, cutting on the stone; when this is completed a rush of urine takes place and the calculus escapes along with it. A catheter or sound should be passed up the ureter to the pelvis of the kidney to see that no other stones are impacted higher up. The opening may be closed with sutures, but probably it is safer to keep it open for a time by passing a drainage tube into the dilated ureter.

Vesico-Uretero Lithotomy.

In the male, when the stone becomes arrested where the ureter enters the bladder wall, by doing a suprapubic cystotomy the calculus may be removed. The patient is placed in the Trendelenburg position. With the finger in the rectum the stone is fixed in position by an assistant, the bladder is opened, and a small probe-pointed grooved director passed into the ureter from the bladder; the ureter is slit up for a third of an inch, fine sinus forceps are inserted, and the stone is extracted.

As the ureter is always distended above the obstruction it may be found difficult to fix the stone, which is apt to recede upwards and evade the grasp of the forceps. But this may be done by the assistant gripping the ureter above the stone with dressing forceps introduced into the bladder, helped by the finger in the rectum.

A Transperitoneal Operation.

This operation is now only adopted when the surgeon is uncertain as to the situation and nature of the obstruction, or is doubtful as to whether one or both ureters are involved. A median incision may be employed under such conditions, but if there be no doubt as to which ureter is affected, the incision should be made along the semilunar line, and curved towards the middle line at its lower end. There are many objections to the transperitoneal method. Unless the ureters be considerably altered by disease they are difficult to find behind the abdominal viscera. The peritoneum is opened both behind and in front, and in the event of any leakage of urine from the ureter may become infected; the position of the wound does not permit of free drainage; and, finally, no additional information can be gained which cannot be ascertained by other and safer methods.

After the abdomen has been opened, the first point is to ascertain the position of the kidney and find the hilum; then, passing the fingers downwards in front of the psoas muscle, the ureter may be traced as low down as the bifurcation of the common iliac artery. When diseased and distended the ureter is more easily traced than in

health, and often the stone can be felt occupying its lumen, while above the obstruction the greatly distended ureter is easily traced behind the peritoneum; indeed, it may be so dilated that, were it not outside the peritoneal cavity, it might be mistaken for small intestine. When the ureter is not the seat of serious pathological changes, when the subperitoneal fat is abundant and the intestine is over-distended with gas, much difficulty may be experienced in tracing the course of the duct. The point at which it is most easily detected is where it crosses the brim of the pelvis.

With the improvements in the operating cystoscope attempts have been made to extract calculi from the orifice of the ureter by dilating the duct with a catheter and removing the stone with McCarthy's flexible forceps passed through the cystoscope. Such an operation may be very nice if it succeeds, which is very questionable, but it is not surgery. It is very true that there are many operators but few surgeons. If a stone is so small that it can be picked out of the orifice of the ureter by forceps passed through a cystoscope, the strong presumption is that if a little more patience and a little less zeal for operating had been exercised the stone would in a short time have found a way out for itself.

The case is a very exceptional one where the lumbo-ilio-inguinal operation is not the most suitable operation to employ. It has many advantages over all the others; when any unusual features present themselves, as, for example, in Cases VI and VII, they can be dealt with easily.

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EPIDEMIC JAUNDICE IN WAR TIME.

BY

S. MORITZ, M.D., M.R.C.P.LOND., M.Sc.VICT.,

SENIOR PHYSICIAN TO THE MANCHESTER HOSPITAL FOR CONSUMPTION; LECTURER IN THE VICTORIA UNIVERSITY, ETC.

JAUNDICE has been known to occur epidemically in peace time among the civil population, affecting then preferentially children. More frequently it has been observed in barracks, prisons, etc., but the largest epidemics have occurred in armies in war time—thus in the American war of 1862, in the Franco-German of 1870, and the Boer war. Its occurrence in this war seems probable.

The etiology of epidemic jaundice is still obscure. Jaeger described, as the cause of the disease, a micro-organism, the *B. proteus flavescens*, which he separated from the urine of patients affected with infectious jaundice.

There is no doubt that epidemic icterus is a disease *sui generis* due to some infective agent. Rainy and damp weather are mentioned by some authors as predisposing causes, but these might be excluded, for we find that the epidemics of jaundice have occurred more frequently in the summer and not in the rainy season. The supposition that the infective agent might be introduced into the human system by food or drinking water seems to be controverted by the fact that in several of the epidemics which have occurred only those men in the army were affected who had been digging dykes or trenches or had been engaged in earthworks. The infection seems to be due, therefore, rather to a virus or organism which develops in the soil during the decay of organic matter (excrements and dead bodies) and which is either swallowed or inhaled. There is no doubt that bad camp conditions were the principal cause of the large epidemic in the American war. In this war, in round numbers, out of 1,087,000 men in the Atlantic army 22,000 men fell ill with icterus; of 1,100,000 men of the central army 20,500 became affected, while of the 30,000 men of the Pacific army only 100 became icteric. The troops most affected were those of the Potomac Camp before Washington (1861-62), those before Yorktown (April, 1862), and those on the Chickahominy (January, 1862).¹ The total number of cases of jaundice among the white troops observed in that war amounted to 71,691.²

The accumulation of huge masses of men, bad drainage and ventilation, the superficial interment of the bodies of the fallen in the immediate neighbourhood of the camps, gave rise to this, the largest of all known epidemics.

Similar causes no doubt prevailed in the siege of Paris (1870), where 2½ per cent. of the troops of the Bavarian army corps were affected with icterus.

The course of epidemic icterus is generally benign. Out of 10,000 cases affected in the first year of the American war, only 40 died from this disease. Sometimes the symptoms are very slight, but usually the illness runs a characteristic course.

The illness usually commences suddenly with rigor and rise of temperature without premonitory symptoms. At the same time there is lassitude, vertigo, and headache, due no doubt to the fever. In severe cases there is soon some stupor or delirium, and these symptoms occur much earlier than they do in typhoid fever. The tongue is furred, and diarrhoea is usual. The liver and spleen enlarge moderately. Between the third and the fifth day, rarely earlier, the icterus commences, so that until then the diagnosis may appear doubtful. The liver and spleen are found enlarged on percussion, the edge of the liver may be distinctly felt, and is sensitive on pressure. The urine often contains moderate quantities of albumin, hyaline and epithelial casts, sometimes blood corpuscles.

The bowels usually become more and more relaxed, and the stools clay-coloured. The temperature remains high, often up to 104°, with irregular remissions during four to eight days; it then goes down quickly, and becomes normal in further four to six days, and simultaneously the hepatic and splenic enlargements and the albuminuria disappear, whilst the jaundice may last ten or fourteen days longer and then fade slowly.

In about 25 to 40 per cent. of the cases a relapse takes place three to eight days after the temperature has become normal. The relapse is usually less severe than the first attack.

There is usually great loss of strength, loss of weight (10 to 20 lb.), and prolonged convalescence. In most cases severe muscular pains, principally in the calves or in the back, are felt from the commencement of the illness, and these pains may persist even during the period of convalescence. Occasionally a spotty erythema of the skin of the thorax and abdomen is seen, in others herpes labialis, rarely an erythema of the fauces and tonsils. Occasionally haemorrhages in the skin, conjunctivae, or retinae have been observed. Coryza, haematuria, melæna, or haemoptysis may occur; still rarer complications are parotitis, laryngeal pareses, neuritis, and iridocyclitis.

The duration of the febrile attack is from eight to ten days, that of the relapse from five to eight days; the whole duration of the illness from three to four weeks.

In regard to differential diagnosis, simple catarrhal jaundice, recurrent fever, and bilious typhoid come into question. Until the micro-organism of epidemic jaundice is found it will be impossible to distinguish slight cases of this illness from simple catarrhal jaundice. In some of the epidemics of recurrent fever many of the cases (25 per cent.) are affected with jaundice; the presence of spirillae in the blood will clinch the diagnosis.

As icterus is said to interfere with Widal's reaction, the differential diagnosis from typhoid may be difficult.

The "bilious typhoid," described by Griesinger fifty years ago as endemic at Cairo, as well as the epidemics of febrile icterus described by Kartulis in Alexandria (1888) and Diamanthophulos in Smyrna (1886), were probably of the same nature. Though records of epidemic jaundice can be traced back at least to the year 1699, and perhaps to Hippocratic times, Weil of Heidelberg, in 1886, described a small number of cases, and since then "epidemic jaundice" has been described under the name of "Weil's disease," not only in German, but also in English textbooks (*vide* Clifford Allbutt, Osler, etc.).

REFERENCE.

¹ Woodward: *Outlines of the Chief Camp Diseases of the United States Armies*. Philadelphia, 1863. ² *The Medical and Surgical History of the War of the Rebellion*. Part III. Washington, 1879.

STATISTICS published by the Bureau of Preventable Diseases of the Department of Health of the City of New York show that the number of cases of rabies found in animals examined in the laboratory of the department decreased from 64, recorded for the second quarter of the year 1914, to 15 in the corresponding quarter of 1915. There was also a reduction in the number of persons examined for dog-bite, and in that of dogs examined for rabies.