jalap (these are for the relief of temporary difficulty only); in mild cases, perhaps, or if the liver is not acting, a dose of calomel, grey powder, and soda, or senna. Regimen is an important element in the treatment if the child should have chronic constipation: abundant water, pure, not hard; "salutaris water" is excellent. In little children add a good infants' food to milk; fruits; fruit jellies; treacle; cooked green vegetables of the softer and more delicate kinds. Some variety in food is useful; a good mixture is better than a monotonous diet. It is, I think, extremely doubtful if coarse food is useful in the long run. It causes atony and weariness of muscle eventually by over-stimulation. And you must insist on regular evacuations. Take care that the stools are not dry and hard, or the child will resist action and increase constipation. Other useful adjuncts are—abundance of fresh air, which aids in improving nutrition; and exercise, which mechanically aids the passage of the contents of the intestine down the tube, and improves general health and muscular tone.

SOME OBSERVATIONS ON RUPTURE OF THE URINARY BLADDER,

WITH AN ACCOUNT OF TWO CASES OF INTRA-PERITONEAL RUPTURE SUCCESSFULLY TREATED BY ABDOMINAL SECTION AND SUBSEQUENT SUTURE OF THE VESICAL RENT.

BY SIR WILLIAM MAC CORMAC,

SURGEON AND LECTURER ON SURGERY, ST. THOMAS'S HOSPITAL.

Two cases of intra-peritoneal rupture of the bladder have been recently under my care in St. Thomas's Hospital. In each case abdominal section was performed very shortly after admission, the rent in the bladder exposed, and carefully closed by numerous interrupted silk sutures. The cavity of the peritoneum was then thoroughly washed out with warm boric solution and the external wound closed. An uninterrupted recovery followed in both instances, the first, so far as I can learn, upon record.

The injury is comparatively very rare. During ten years only five cases of rupture of the bladder, not including the two now recorded, were admitted to St. Thomas's Hospital. In France, Germany, and Austria I learn that this form of injury is extremely rare. Intra-peritoneal rupture of the bladder has hitherto proved almost uniformly fatal. Sir Henry Thompson, in Holmes' System of Surgery, last edition, says "recovery can hardly be regarded as possible." Some few cases of alleged recovery have been recorded, but in all but perhaps one of these, where the abdominal cavity was opened, the diagnosis must be considered as more or less doubtful. In the case above adverted to, Walter of Pittsburg, U.S.A., performed abdominal section ten hours after the patient had received a blow on the lower abdomen. A pint of blood was sponged out of the peritoneal cavity, and a rent two inches long seen in the bladder. This was not further interfered with. The abdominal wound being immediately closed, opium was given and a catheter introduced into the bladder. Recovery ensued.

The most recently published article on the subject is by Mr. Rivington, in "Heath's Surgical Dictionary" (1886). He there states that "no indubitable case of recovery after intra-peritoneal rupture of the bladder is on record." Unfortunately, the experience of operative interference has been equally unsatisfactory. In a very few cases abdominal section has been performed with subsequent suture of the intra-peritoneal rent, but hitherto without success, unless Hofmokl's case be so regarded. Mr. Heath,¹ Mr. Willett,² and Mr. McGill of Leeds³ have published cases of intra-peritoneal cystorraphy—these being, so far as I know, the only ones in this country. Professor Hofmokl,⁴ relates a case of rupture of the bladder complicated with separation of the symphysis pubis. The subject fell from a height to the ground and fractured the pelvis. The symptoms were chiefly those of extra-peritoneal rupture. On an abdominal incision being made much blood and urine were found in the cellular tissue behind the pubes, and the bladder was torn

opposite this, the serous layer being detached for a little distance over the fundus. Although some bloody fluid was found in the peritoneal cavity, the description does not make it clear that the rent in the bladder extended through its peritoneal investment. The rent was partially sutured and the patient eventually recovered. In the cases of Messrs. Heath and Willett the sutures gave way near the lower angle of the wound, and fresh extravasation took place. They were passed through the whole thickness of the bladder, which Maximow,⁵ in his experiments on dogs proves, was always attended by fatal consequences. Mr. J. Duncan of the Royal Infirmary, Edinburgh,⁶ has also performed abdominal section in one case, after failing to find the rent by digital exploration after perineal cystotomy; and, just as in the instance of Walter of Pittsburg, he did not suture the rent in the bladder. A fatal result followed, apparently due to suppression of urine. Mr. Brown, of the Leeds Infirmary,⁷ performed perineal cystotomy with subsequent drainage. The rupture, although sufficiently large to admit the end of the middle finger, was not discovered by the finger passed into the bladder. The patient did not rally from the operation, and shortly after died. Extensive recent peritonitis was found post mortem. There was no history of injury in this case. Mr. McGill, of the same hospital,⁸ records a case of intra-peritoneal rupture by direct violence. He sutured a median vertical rent in the bladder, four inches long, with nine chromic gut sutures. The operation was performed about sixty-eight hours after the accident. The introduction of the sutures was found to be facilitated by the previous distension of the rectum with an air tampon, which materially raised the recto-vesical cul-de-sac, a method suggested by Gueterbock.⁹ The patient, who was fifty-four years old, sank the following day from shock. At the necropsy, performed three days and a half after the accident, there was no fluid in the peritoneum. No signs of peritonitis were found, and nothing very abnormal in any organ. Mr. Teale some years ago stitched up a ruptured bladder and inserted a drainage-tube through the perineum. The patient died the same night, his death being apparently accelerated by considerable hæmorrhage from the perineal incision.

There is thus considerable diversity in the practice recommended for adoption in cases of intra-peritoneal rupture of the bladder. Catheterism simply has been practised, or washing out the peritoneal cavity from the side of the perineum or urethra; median or lateral cystotomy has been performed to provide direct drainage through the perineum; aspirating the abdominal cavity, abdominal section, sponging out urine and blood from the interior, leaving the rent undisturbed, have been adopted in at least two instances; and lastly, abdominal section, with suturing of the rent in the bladder, in some cases completely, in others leaving the anterior part unclosed, or making a drainage opening in the part of the bladder uncovered by peritoneum, has been tried.

CASE 1. (Mr. Cooper and Mr. Brockway, dressers; Mr. F. Nichol, house-surgeon).—William S—, aged thirty-three, labourer, an old soldier, was admitted into hospital on Sept. 22nd, 1885. About 8.30 p.m. on the 21st, the patient, whilst pursuing his son, ran "full tilt" against an iron upright post at the entrance to a court. The head of the post struck him in the region of the umbilicus; he fell to the ground, and for a minute or two felt stunned, but soon was able to rise and walk slowly home in great pain, a distance of 250 yards. He vomited twice shortly after the accident, and about half an hour later felt an inclination to micturate. He tried and failed, but a strong desire continued. Throughout the night the abdominal pain was severe; he walked up and down his room, unable to remain at rest or lie in bed, and striving continually to pass urine without success. He had micturated, he felt sure, an hour and a half before the accident. He had drunk about a quart of beer during the evening, but denies that he was intoxicated. In the morning, the pain increasing and finding himself unable to pass urine, the man walked, unaided, to the hospital about noon on the following day, a distance of one mile. There does not seem at any period to have been anything like collapse.

On admission, fifteen hours and a half after the accident, the patient, a powerfully built, healthy-looking man, of florid complexion, complained of intense abdominal pain

¹ Med. Chir. Trans., vol. lxii.

² St. Bartholomew's Hospital Reports, vol. xii.

³ THE LANCET, Nov. 20th, 1886.

⁴ Wiener Medizinische Presse, Sept. 1886.

⁵ Rev. de Chirurg., 1881.

⁶ THE LANCET, Aug. 28th, 1885.

⁷ Ibid., Nov. 20th, 1886.

⁸ Ibid.

⁹ Langenbeck's Archiv, vol. xxxi., 1885.

and betrayed the anguish he suffered in his face. The inability to pass urine was complete; his expression was very anxious, and his manner uneasy. There were then no symptoms of shock. The abdomen was distended and exceedingly tender all over, more especially in the epigastric and hypogastric regions. There was resonance anteriorly, with dulness in both flanks, varying in extent with the position of the patient. A No. 6 soft black catheter was passed, and one ounce and a half of urine, slightly tinged with blood, drawn off. Temperature $99^{\circ}8'$; respiration 24. About 2.30 P.M. I saw the patient, and on again introducing a catheter drew off ninety-five ounces of slightly red coloured fluid. The point of the instrument seemed grasped, and did not move freely, proving the bladder to be contracted, but the existence of any damage to its wall could not be made out. The level of dulness in the flanks was sensibly diminished, and the patient experienced some relief. Taking into account the history, symptoms, and especially the large amount of blood-stained fluid removed, an intra-peritoneal rupture of the bladder seemed probable, and I decided that abdominal section should be performed at once, it being then some nineteen hours after the receipt of the injury.

Operation.—At 3.15 P.M., the patient having been placed under the influence of ether, a full-sized catheter was introduced and four or five ounces of bloody fluid drawn off. An incision about six inches in length was made in the median line terminating just over the pubes. The abdominal wall was very fat. The linea alba having been divided and the recti muscles retracted, all bleeding points were secured before the peritoneal cavity was opened. On fully dividing the peritoneum and retracting the margins of the wound, an extensive rent could be felt in the bladder, and the point of a catheter could be perceived free in the peritoneal cavity. The bladder was empty and firmly contracted behind the pubes. No urinary smell was perceptible. The rent was in the posterior aspect of the bladder, and extended from the superior fundus to the recto-vesical cul-de-sac; it was median and vertical, and as nearly as may be four inches in length. The edges were rather irregular and thickened. So deeply did the rupture extend into the pelvis that great difficulty was afterwards experienced in the introduction of the deeper sutures. To facilitate this the parietal peritoneum was divided transversely on each side, and it was then found possible to draw the bladder much further out. The intestines were pushed back with sponges held by one assistant, while a second pulled the bladder forward. Sixteen sutures of fine silk were then introduced after Lembert's method, including the serous and muscular coats only, at intervals of about a quarter of an inch apart, beginning at the lower part, and the first and last sutures were introduced quite beyond the limits of the injury. The edges of the mucous membrane were thus thoroughly inverted and the serous surfaces brought into contact (Fig. 1). Wherever the closure did not seem absolutely complete and perfect, catgut sutures were introduced to the number of six or eight between the silk ones, including the peritoneum only. The bladder was now twice moderately distended with a weak solution of boric acid injected through the catheter by a Higginson's syringe, and proved perfectly watertight. The peritoneal cavity was finally irrigated with two gallons of a 1 per cent. solution of boric acid dissolved in water previously boiled and cooled down to a temperature of 98° F. The fluid was introduced by means of a tube attached to an irrigating can raised 8 ft. from the floor. It overflowed into a macintosh and thence to a tub placed at the foot of the table, in the manner customary during ovariectomy. The irrigation was continued until the escaping fluid became absolutely clear. There was no sponging of the peritoneum. A glass drainage-tube was introduced from the centre of the wound to the recto-vesical cul-de-sac. The edges of the peritoneum and external wound were then closed by deep silk sutures, and iodoform, iodoform gauze, and salicylic wool applied, with bandages of carbolic gauze. A soft black catheter was fastened in the urethra, the tip only projecting into the bladder. The operation lasted two hours, and was conducted under the carbolic spray throughout, save for a few minutes when the steam failed. The peritoneum and intestines looked quite healthy, presenting a polished appearance, apparently not injected. No blood-clots were observed.

The subsequent progress of the patient may be briefly summed up. Almost directly after the operation all pain and abdominal tenderness completely disappeared. There was no sickness. The man slept quietly through the night,

an injection of a quarter of a grain of morphia being given. During the subsequent five days the temperature never reached 100° ; on the eighth and ninth days it was a little over 100° in the evening. The pulse and respiration were normal. He passed from thirty to forty ounces of urine daily, at no time containing any blood. This was at first drawn off by the catheter at intervals of four hours; but on the third day the catheter was removed, and subsequently he passed urine naturally, the instrument not being again needed. As regards the abdominal wound, it healed quickly and well. A very small amount of serous discharge was sucked out of the drainage-tube at each dressing, and on the fourth day the drain was removed altogether. The opening it left somewhat delayed the final closure of the wound, but on the eighth day the sutures were removed, and within the fortnight the abdominal incision had cicatrised and the patient pronounced convalescent. In three weeks the man was able to rise, and he shortly after went home and resumed his ordinary work, as well apparently in all respects as he was before the accident. Beyond what was incident to confinement in bed there was no discomfort complained of, and he had not a particle of pain or distress of any kind throughout. None of the sutures were seen in the urine while the man remained in hospital, though carefully looked for.

CASE 2. (Mr. F. Nichol, house-surgeon; Mr. C. H. James, dresser, to whom I am indebted for these notes.)—C. F.—, aged thirty-seven, a slater, living at Camberwell, was admitted on Nov. 17th, 1886. The subject of the accident is a stout, heavy-built man, 5 ft. 6 in. high, weighing 15st. On the day previously, at 11.45 A.M., while he was at work on some scaffolding, he stepped backwards and fell a distance of eighteen or twenty feet, in a sitting posture, upon some soft clay. He did not become faint, or indeed have any symptoms of collapse, nor did he consider himself seriously hurt. He was able to walk a few yards to a cab. While waiting for this to come up he had a desire to pass urine, but failed to do so, and the desire soon left him. On arriving at the hospital at 1 o'clock, he walked in, getting the porters to assist him on account of his back feeling so "queer." It was then found that the skin in the region of the sacrum was bruised and slightly ecchymosed. No injury to the pelvis or spinal column was detectable. In the casualty room he was able to stand and move about without apparent inconvenience, and complained of no abdominal pain or tenderness. He had no particular pain or distress of any kind. He stated distinctly that he had no desire to micturate, and therefore a catheter was not passed. He had drunk one pint of beer about half an hour before the accident, and had micturated about the same time. He had also had a pint of beer between 6 and 7 A.M. A flannel bandage was applied to the abdomen and hips, and he was told to return home and rest quietly. About 4 o'clock the same afternoon he commenced to feel a little pain at the lower part of the abdomen, but it was so slight that it was not mentioned when his club doctor visited him at about 5 P.M. in order to give a sick certificate. In fact, he felt fairly well till about 6 P.M., when he experienced some pain and a desire to micturate, and again failed to pass anything. This desire became more and more urgent, and the fruitless efforts to gratify it kept him awake all night. There was no vomiting. At 9 A.M. on Wednesday his club doctor again visited him. Then he complained of great abdominal pain and tenderness, and a strong desire to micturate. The doctor tried to pass a catheter, but, failing to get it into the bladder, recommended the patient to go to the hospital without delay.

At 11.30 A.M. the patient was brought to the hospital in a cab, and admitted. He was seen by the house-surgeon, who tried to pass a full-sized catheter, but on account of a moderate stricture about four inches from the meatus was unable to do so. A No. 6 silver catheter was easily passed, and six ounces of turbid coffee-coloured urine were drawn off. The abdomen was extremely tender all over, especially in the epigastric and hypogastric regions. It was not much distended or very tense. It was resonant all over anteriorly, but dull on percussion in the extreme flanks, the dulness shifting with the position of the patient. A slight ecchymosis was to be seen at the lower part of the abdomen on the left side. After being put to bed the patient lay on his back with his legs drawn up, and any movement of the trunk was attended with severe pain. The man had a most anxious expression. The temperature was 97° ; pulse 143. There were no symptoms of collapse. When he had

been taken into the Leopold ward, I was sent for. After admission the patient's symptoms rapidly increased in severity. The anxiety of countenance became more marked, the pain and desire to micturate more intense, and the abdomen more tender and distended. At 2 P.M. I found the symptoms as above detailed. On introducing a catheter, it seemed at first to hitch in the neighbourhood of the bulb, conveying the sensation of a false passage. The bladder was found to be contracted. Three ounces of dark brown-coloured bloody urine and clots were drawn off. The fluid was without smell. In consultation with Mr. Croft I decided that the evidence of intra-peritoneal rupture of the bladder was sufficiently strong to justify immediate abdominal section and exploration, and for this preparation was at once directed to be made.

Operation.—At 2.30 P.M. the patient was placed under the influence of ether by Mr. Lynch, the abdomen having been shaved and washed with 1 in 30 solution of carbolic acid. A red gum-elastic catheter, No. 9, was passed, and three or four more ounces of fluid were drawn off. The spray was used throughout. An incision about six inches in length, extending from an inch below the umbilicus to the symphysis pubis, was made through the abdominal walls, which were loaded with fat. The linea alba was sought for and divided. A great thickness of subperitoneal fat was also cut through before the peritoneum was exposed. At the lower part of the incision the fat appeared of a darker colour, as if recently bruised, but there was no extravasation into the *cavum Retzii* or sign of extra-peritoneal rupture. It was therefore decided to lay open the peritoneal cavity. As soon as this was done, a large quantity of clear fluid, serum and urine, quite free from odour, gushed from the abdominal cavity. Fifty ounces of this were collected, but a much larger quantity flowed down the sides of the abdomen and between the patient's legs, saturating the bedding. On introducing the finger the rent was at once detected. The bladder was now drawn forwards, a transverse incision of the peritoneum of half an inch being made on each side. An irregular obliquely placed rent in the bladder was then clearly exposed, situated at the upper and posterior part, and slightly to the left of the middle line; it was much more extensive in the outer than the inner wall, measuring two inches in length where the peritoneal covering and muscular coat were ruptured, and a quarter of an inch where the internal coat was torn. A blunt director passed into the wound came into contact with the catheter previously introduced. The rent in the bladder was closed by twelve fine silk sutures, rather less than a quarter of an inch apart; the ends were cut short. Each suture was passed by means of an ordinary fine curved needle introduced about a quarter of an inch distant from the margin. (Figs. 1 and 2.) The first and last pairs of sutures were passed through the bladder wall completely beyond the limits of the rent, so as to prevent the possibility of leakage from its extremities. On drawing the sutures tight, the closure of the rent seemed so complete and secure that no additional ones through the peritoneal coat appeared necessary. The bladder was then fully distended by injecting nine ounces of a warm boracic acid solution through the catheter, and found to be perfectly watertight. The abdominal cavity was thoroughly washed out with about two gallons of a 1 per cent. solution of boracic acid warmed to a temperature of 98°. The irrigator consisted of a large glass vessel raised four feet above the patient's abdomen, with a long indiarubber tube and glass nozzle attached. At first the fluid flowed out slightly tinged with blood; subsequently it became quite clear. There were no clots. Before the external wound was closed as much of the residual fluid as possible was expressed. No signs of inflammation could be detected in the peritoneum where it was exposed during the operation. The intestinal coats were free from injection; there was no adhesion or lymph visible. No vessels of importance were divided in the external wound, and all bleeding points were secured as they appeared, catgut ligatures being used. A suture was passed on each side, uniting the transversely divided edges of the peritoneum, and the abdominal wound and peritoneum were then united by eight stout silk sutures passed through the whole thickness of the abdominal wall. No drainage-tube was inserted in the peritoneal cavity, nor was a permanent catheter passed into the bladder, confidence being felt in the effective and complete manner in which the rent in the bladder was closed. A small, short drain was, however, inserted in the lower part of the external wound. Just before the dressings were applied, a

fit of vomiting came on. There was severe abdominal strain and a certain quantity of boracic fluid was forced up between the sutures. The operative proceedings lasted exactly two hours. The patient's pulse kept good, and the respiration was quiet and easy, except for a minute or two while the abdominal cavity was being washed out. Iodoform was powdered over the abdomen and groins. Iodoform gauze and salicylic wool were applied to the wound and kept in position by carbolic gauze and flannel bandages. The patient was lifted into bed and a pillow placed beneath his knees. A half-grain morphia suppository was introduced into the rectum. Before removal from the table the bladder was ascertained to be empty and the catheter was withdrawn.

The subsequent recovery of this man proved even more rapid than the last. He rallied very quickly after the operation, and expressed himself as feeling comfortable and free from pain. One hour after the temperature was 99.8°; pulse 104. Shortly after being put to bed he involuntarily passed three ounces of urine, and he continued to void a small quantity in this way at short intervals until the following day, when he regained partial control and passed some urine every two hours. The following day (the third) the control was complete, and he emptied the bladder every three or four hours without trouble. There was never any blood in the urine, and the quantity varied from thirty to forty ounces in the twenty-four hours. The temperature rose on the second and third days to 101°, and afterwards steadily declined to normal. The abdominal distension rapidly diminished, and he never felt any pain or tenderness on pressure. His only complaint at first was thirst and some pain from lying on his bruised buttocks. A week after the operation the external incision was found united throughout. The sutures were removed, and some strips of strapping applied to support the fat abdominal wall. At some of the suture openings the tension had caused some irritation, and a drop or two of pus was seen. On Nov. 28th (the twelfth day after the operation) the man was allowed to sit up, being apparently in all respects convalescent. He may now (Dec. 2nd) be regarded as quite well, only a fortnight having elapsed since the operation.

Remarks.—In the detailed account of these two cases there are several features of great interest. Both patients were adults, heavy, fat men. In neither was any other injury of importance present, and neither appears to have suffered any symptoms of collapse—a condition so commonly ascribed to a state of severe visceral lesion. In both, too, at the time of operation, the peritoneum was free from any trace of inflammatory change. The first patient walked home after the injury, and a distance of a mile from his house to the hospital on the following day. The second patient immediately drove to the hospital; but on examination by a most careful house-surgeon no symptoms directing attention to the bladder injury were observed. Whilst being examined the man stood up quite tranquilly, and apparently free from suffering. The only thing left undone, perhaps, was to pass a catheter, which would doubtless have drawn off bloody fluid. But for this there was no indication, as no desire to urinate was felt and the urine had been passed an hour before.

The success of the method by abdominal section must largely depend on matters of detail, and none can be more important than the method of suturing. The operation is not a new one. It had been suggested long ago by Benjamin Bell, who proposed in 1789 to suture the bladder after performing abdominal section. Grandchamps in 1826 sutured the bladder in animals, and proposed that it should be done in man. Blundell, an American surgeon, in 1840 proposed to suture the rent to the external wound. Larrey, Legouest, Gross, Cusack, Holmes, and probably others, have also advocated suture of the bladder after rupture. Nevertheless, in the discussion on Heath's and Willett's cases, the method by suture was considered by many of doubtful advantage, and in his recently published paper Gueterbock states that the practice of complete closure of the bladder wound adopted by Heath and Willett has in his opinion no future before it, that a supra-pubic opening left in the bladder for drainage is the important matter, and also that the toilette and drainage of the peritoneum before closing the external wound are of comparatively little moment. The accurate and complete suture of the bladder wound by sutures inserted through the whole thickness of the serous and muscular coats, carefully avoiding the mucous coats, is of the greatest importance. The serous surfaces should be inverted, brought into close contact, and the first and last stitches

inserted quite beyond the extremities of the wound, so that leakage at either angle, the most common place (Figs. 1 and 2) for it to occur, may be rendered impossible. Znamensky of Moscow, in an article on partial resection of the bladder in dogs,¹⁰ lays the utmost stress on the accurate closure of the wound by sero-muscular sutures. Maksimow also attaches the greatest importance to this part of the operation from his experiments on dogs and rabbits, and so does Vincent of Lyons in a paper communicated to the Transactions of the International Medical Congress of London. In fact, in all the experiments it was clearly shown that success almost entirely depends

FIG. 1.

Diagram showing the edges inverted by the sero-muscular suture. The upper suture represents the serous suture, which is as a rule unnecessary.

upon the accuracy with which the sutures are placed. Vincent recommends a double row of sutures—one sero-muscular, one serous (Fig. 1),—but this is unnecessary. Znamensky abandoned the double row of sutures recommended by Vincent, because he found that sutures passed through the peritoneum only uniformly gave way, and on examination afterwards an ulcerated surface was found, while the deeper sero-muscular row of sutures could be seen between holding fast. Znamensky, Vincent, and Petersen recommend interrupted silk sutures as the best method and material to employ. I myself regard the double row of sutures as being unnecessary. The continuous

FIG. 2.

Diagram representing the manner of placing the interrupted sero-muscular sutures so as to approximate two surfaces of serous membrane when the sutures are drawn tight. It will be seen that two points of suture have been inserted at each end beyond the limits of the wound.

suture is the least desirable form. Opinions differ as to the comparative value of catgut, silk, and silver sutures. Catgut, I think, is not sufficiently reliable; silver is not very manageable. Experience shows us that carbolic silk is, on the whole, most efficient and trustworthy, and that buried silk sutures employed in aseptic operations may be safely left without risk of giving further trouble. Vincent employed silk in twenty-nine experiments, and never with any unfavourable consequence. It is not, however, the quality of the material so much as the manner in which it is employed that is of chief moment. The

serous surfaces should be brought into contact by a sero-muscular suture and the mucous membrane always excluded. When the mucous coat has been traversed in animals the result has nearly always proved fatal. The mucous membrane falls between the edges of the wound on drawing the sutures tight, and hinders union. The loop of suture within the bladder is a foreign body, and salts are deposited on it. The urine may find a channel to the interior of the wound or the cavity of the peritoneum, through the points of passage of the sutures through the mucous membrane. The transverse division of the peritoneum on each side permits the bladder to be very fully drawn out of the wound, and is not the least likely to interfere with the future success of the operation. Whether the introduction of a rectal tampon be of greater advantage, I am not prepared to say. On trying it on the dead subject, I found that it somewhat raised, and certainly steadied, the recto-vesical cul-de-sac, and would thus probably render the deeper stitches more easy of introduction. I believe a free parietal incision important. Greater facility is thus afforded for inspection of the parts and for the introduction of sutures, the needful manipulations are rendered easier, while the intestines can be controlled and pushed upwards by flat sponges. Probably also the all-essential cleansing of the abdominal cavity can be more perfectly realised. The earlier the operation is performed the greater the prospect of success, hence prompt diagnosis becomes all important, and this should be followed by immediate action; but in doubtful cases I regard an exploratory operation as often justifiable. In itself it need not materially aggravate the danger to life, while it may prove the means of discovering the presence of a rupture previously only suspected to exist. If the deeper structures be first divided near the pubes, the anterior surface of the bladder can be exposed and examined before opening the peritoneal cavity. If a rent be found there, it may be unnecessary to proceed further; otherwise the serous cavity can be laid open and the upper and posterior surfaces of the bladder laid bare. No other manner of treatment seems likely to prove of real avail in rupture of the bladder. Lastly, great importance must be attached to the thorough washing out of the peritoneal cavity. The urine and bloody serum permeate everywhere. Wegner's experiments prove that extravasated urine does not merely gravitate, but that peristaltic movements of the bowel speedily distribute the fluid over the entire peritoneal surface. A 1 per cent. boric solution dissolved in previously boiled water and cooled to a temperature of 98° F. seems to me well adapted for the purpose, or water simply boiled can be employed.

As regards the interval after the injury at which the operation may be successfully undertaken, this may possibly prove greater than has hitherto been held. Mr. Rivington speaks of some period within the first twenty-four hours. In one of my cases twenty-six hours had elapsed, and, just as in the other case, without any sign of peritonitis having shown itself. In Mr. Brown's case no peritonitis was apparent after three days and a half; in Hamilton's, after five days and four hours. The mere presence of urine therefore, or urine and blood, in the peritoneal cavity, does not immediately set up inflammatory changes, as was once generally believed. In Professor Vincent's experiments, he states that in fifteen rabbits where the peritoneal cavity was flooded with urine for a longer or shorter period only three died. In a case of ovariectomy in my own practice, in which there were extensive and very firm adhesions, the bladder was torn through to the extent of three inches during an attempt to separate them. Although the catheter had been introduced immediately before the operation, the bladder contained several ounces of urine, which escaped into the peritoneal cavity. I sutured the bladder wound carefully, and the untoward occurrence was not followed by any bad consequence. The patient, although sixty-eight years old, made a good recovery in the usual time. Vincent, Julliard, Atlee, Pozzi, and Sonnenburg mention cases of a similar nature, which go far to prove that extensive intra-peritoneal injury to the bladder may be readily recovered from when it is promptly dealt with, as will be of necessity the case where it occurs during the performance of an ovariectomy. In ordinary traumatic cases of intra-peritoneal rupture of the bladder the margins of the rent are generally lacerated in appearance and soon become swollen. Rivington recommends paring these edges off, but when they are fully inverted by the method of suture paring becomes unnecessary, and needlessly adds to the difficulty and duration of the operation. When the rent

is in the upper and back part—the ordinary situation, in fact—it is, in my opinion, hurtful to perform perineal cystotomy, unless, indeed, in cases where the urethra is obstructed by stricture or rupture.

A drainage-tube introduced from the perineum into the bladder inflicts a further severe complication in cases of intra-peritoneal rupture. Vesical drainage can be effected through the urethra. In some cases the catheter *à demeure* may be indicated, but it is better practice surely to introduce a catheter each time the bladder has to be emptied if the patient be unable to void his urine. I think the prolonged detention of a catheter introduces a distinct element of risk; it favours the occurrence of septic decomposition within the bladder, and hinders the healing process in the rupture. If the rent be sutured effectively, the patient runs less risk from moderate distension of the bladder, which is all that can possibly occur in a case properly watched, than he does from the consequences of retaining a catheter for some days within the viscus. The experience of my two cases goes far to prove that the catheter may in many instances be safely dispensed with altogether. I am sure, too, an abdominal drainage-tube is not in most cases needful, and that its presence proves a source of danger to the patient. If the peritoneal cavity be thoroughly washed out the presence of a drainage-tube can scarcely be necessary. What watery fluid is left behind will be soon absorbed, and there is no surface from which bleeding can recur as from adhesions after a case of ovariectomy. Where peritonitis has already taken place, drainage, however, will be of advantage. The practice of making an opening in the superior fundus for drainage purposes, advised theoretically by Gueterbock, suggested also by Bryant in his "Practice of Surgery," and adopted by Pozzi and McGill, I should condemn in cases of intra-peritoneal rupture. It inflicts a further injury on the bladder, and can be dispensed with without incurring additional risk. Occlusive dressings can scarcely be effectively applied to the abdominal wound. The drainage opening must be left free, and as it is practically in contact with the remainder of the abdominal wound the advantages of antiseptic dressing cannot be realised.

Most authorities consider it unlikely that a rupture of the bladder should be overlooked. But in the earlier period, before the manifestation of the severer symptoms, this error, judging by past experience, seems not unlikely to occur. Many cases are upon record where the lesion was not diagnosed for several days, nor until the occurrence of severer symptoms not only made the nature of the injury clear, but completely contra-indicated operative interference. In fact, most of the symptoms usually ascribed to the presence of an intra-peritoneal rupture of the bladder may at first, and for some time, be entirely absent in some instances, and none of severity appear for several days.

I have not included the question of diagnosis in the scope of this communication. But I should say that, although there may be many cases where certainty of diagnosis is difficult to arrive at, yet the group of symptoms usually associated together, taken with the history of the injury, is in the majority of instances sufficient to render a correct diagnosis reasonably certain. Moreover, the only manner in which an uncertain diagnosis can be made certain is by practising an exploratory laparotomy with greater frequency. If this be done early enough, it will prove successful in uncomplicated cases, while the operation in itself scarcely aggravates the patient's condition, and is surely better than a hesitating, halting practice in expectation of improvement, which usually never takes place. I would strongly urge, therefore, the necessity for an earlier interference and bolder practice. The whole history of abdominal surgery points in this direction, and here we have to deal with a lesion in which recovery is otherwise admittedly hopeless.

Harley-street.

SURGICAL AID SOCIETY.—The twenty-fourth annual meeting of this charitable organisation was held on the 6th inst., the Lord Mayor presiding. During the past year the Society has relieved 6412 persons, including 2311 men, 3156 women, and 945 children, or an average of 123 a week; while the total number of patients assisted by the Society since it was called into existence is 58,587. The total income for the year was £5485, of which £3469 were derived from annual subscriptions, being an increase of £310. The expenditure amounted to £5414. Donations amounting to £380 were received at the meeting.

LITHOLAPAXY IN MALE CHILDREN AND MALE ADULTS.

By SURGEON-MAJOR D. F. KEEGAN, M.D. DUB.,
RESIDENCY SURGEON, INDORE, CENTRAL INDIA.

(Continued from page 1071.)

CASE 38.—K—, a boy aged two years and a half, was admitted into hospital on June 9th, 1885, suffering from stone symptoms, which had existed for three months. A No. 7 lithotrite and a No. 7 evacuating catheter passed readily into the bladder. It was not considered necessary to incise the meatus. The lithotrite was introduced into the bladder on four different occasions. On its last withdrawal from the bladder, the meatus of the urethra was torn slightly, as some of the debris had got clogged between the blades of the lithotrite, thus increasing the size of the lithotrite from a No. 7 to perhaps a No. 7.5. Weight of stone removed 11 grs., and consisting of uric acid. Time occupied in operation seventeen minutes.—10th: Urine clear; boy cries much when passing urine.—12th: Patient doing well; urine clear; much less pain in passing urine.—13th: Patient feels much better. The boy's father, living not far from Indore, took the child home. On July 26th the father brought the boy to the hospital to show him to me. The boy had grown plump, and had continued to pass urine without pain and with perfect freedom.

CASE 39.—M. A. K—, a boy aged two years and nine months, was admitted into hospital on July 8th, 1885, with stone symptoms, which had existed for three months. Urine clear and acid in reaction. There is great straining in passing urine, which comes away drop by drop. Evening temperature 100.6°. Next day a No. 8 lithotrite passed readily into the bladder. Lithotrite introduced five times. A No. 7 evacuating catheter employed to remove the debris. Stone weighed 32 grs., brick-dust colour, consisting principally of uric acid. Operation lasted thirty-one minutes.—10th: Urine quite clear; slight pain in micturating.—12th: No pain in passing urine, and the father took the boy home. On the 19th the father brought him to the hospital for inspection. The boy complained of no symptoms of stone, and passed urine quite freely and without pain.

CASE 53.—G—, a boy aged three years and three months, was admitted into hospital on February 6th, 1886. When sounded, a stone was detected. Chloroform having been administered, I tried to pass a No. 9 and then a No. 8 evacuating catheter, but found the meatus of the urethra too small to permit their passing. I then introduced without any difficulty a No. 7 evacuating catheter into the bladder, into which I injected some tepid water. A partially fenestrated No. 8 lithotrite was then passed with ease. When in the bladder, and before attempting to seize the stone, I opened the blades of the lithotrite very slightly by working the screw action. I did so to allow for clogging, and then withdrew the lithotrite, thus slightly opened, with the greatest ease through the membranous portion of the urethra. When coming through the meatus of the urethra the lithotrite ruptured it (the meatus) and caused a little bleeding. I then screwed home the lithotrite and passed it again into the bladder, and immediately struck the calculus, but found great difficulty in seizing it. The stone seemed to me to be quite spherical, for it slipped from out the blades of the lithotrite on several occasions. I seldom recollect having experienced so much difficulty in seizing a stone as I did on this occasion. However, after some thirteen minutes' duration, I at last succeeded, and then crushed it readily. After the crushing, a No. 8 and then a No. 9 evacuating catheter passed with ease into this boy's bladder. Indeed, I feel quite certain that I could have passed a No. 10, or perhaps even a No. 12, evacuating catheter, if I had found it necessary or advisable to do so, *once the meatus of the urethra had been ruptured*. Owing to the great difficulty experienced in seizing the stone the operation lasted thirty-seven minutes, although the stone weighed only 70 grs.—Feb. 7th: No pain on pressure, being made over the bladder or course of the urethra; pain in passing urine less than it was prior to the operation.—8th: Urine clear and pale; no pain over bladder or urethra; no fever; pain in passing urine less.—12th: Child placed under chloroform, and