

dyes, such as fuchsin, methyl blue, rhodamin vesuvin, and many others. The best of these proved to be ethyl violet, but the difficulty in obtaining it absolutely pure forms an objection to its use. To methyl violet I have given the name "pyoctanin," and it can be obtained absolutely pure from the well-known firm of E. Merck in Darmstadt. Certain auramines proved to be the next best, when used in solutions of 1-4000 to 1-1000.

We next tried the action of m. v. on the enzymes, and as a typical example for this purpose we took the diastatic ferment of malt. In solutions of 1-1000 and 1-2000 a striking retardation of its diastatic action on starch granules was observed.

2. *Experiments on animals*—As my original purpose in beginning these experiments was to find an antiseptic for ophthalmic use, I began by experimenting on rabbits' eyes, and for this purpose of course chose albinos. A 1-1000 solution dropped into the eye stains the conjunctiva, sclerotic, and iris, but not the cornea, if it be unwounded. The staining passes off by the next day. If m. v. in bulk be powdered into the conjunctival sac, it is all stained very deeply, and here and there the substance precipitates on the conjunctiva and cornea with a metallic lustre. In a day or two the epithelium is all shed off in large flakes, which show under the microscope a striking fatty degeneration, almost like that of the phosphorous kidney; but, nevertheless, these flakes, as well as the whole conjunctival sac are quite free from bacteria. The appearance of the staining is the same as in other mucous tissues. There is a peculiar action of m. v. which often takes place in the human eye—viz., a great dilatation of the pupil without any paralysis of accommodation. Subcutaneous injection of 20 centimetres or more of a 1-1000 solution will not cause bad effects in rabbits or guinea-pigs, and even comparatively large quantities (10 centimetres) can be injected into the peritoneal cavity without morbid appearances, but larger quantities cause death. On section, all the abdominal organs are found to be stained a deep blue, but the blood and bloodvessels are of normal appearance. This is very well seen in the kidney. Death is caused in such cases from the staining, and also from paralysis of the important nerve centres. There is no trace of serous exudation or of inflammation found on section, even in the peritoneal cavity. Rabbits eat the dye, if properly mixed with their food, in large quantities, and without any injurious effects. On section the intestine appears moderately blue stained. The faces of an animal fed on m. v. are of an intensely blue colour.

3. *Therapeutical and other experiments*—I inoculated a rabbit's eye with staphylococcus pyogenes aureus, and thus caused in it a severe hypopyon. I then dropped in some m. v. solution, thus causing deep staining of the whole extent of the external wound, and also of the flaky collections of pus in the anterior chamber, and putting a stop to the suppurative process. I have obtained in my clinic most successful results in the treatment of corneal ulcers which had hitherto resisted all the usual remedies, and I am of opinion that the m. v. treatment for these cases will supersede that by the galvano-cautery. I have also used it with very good results in a number of other external eye diseases—such as blepharitis, conjunctivitis, phlyctæna, and eczema of the lids. I have also used it with success in internal eye diseases, such as keratitis parenchymatosa, iritis serosa, old-standing cases of choroiditis, and even in one case of sympathetic ophthalmia. I have also had good results in some few surgical cases which have come into my hands, such as varicose ulcers &c., but of course I have not had much opportunity of following up this class of treatment. Another important point is this. Since, as has been shown above, one can inject relatively large quantities into the peritoneal and pleural cavities without injury, and as animals can eat also, without injury, large quantities of the dye, so also is its further application conceivable, and the methyl violet treatment of purulent pleurisy and peritonitis, typhoid and dysenteric ulcers, &c., is not beyond the bounds of possibility. A slight disadvantage of the surgical application of m. v. is that one is liable to stain the fingers and hand blue. This staining is, however, easily removed by alcohol, ammonium sulphide, &c. The forms in which I have used the substance are those of solutions, pencils, powders, and unguents, and occasionally the pure substance itself. I shall discuss the details as to the employment and dosage of the individual preparations in my second paper.

Birkenhead.

## AN OPERATION FOR VESICO-VAGINAL FISTULA THROUGH A SUPRA-PUBIC OPENING IN THE BLADDER.<sup>1</sup>

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AN operation for vesico-vaginal fistula through a supra-pubic wound in the bladder was first suggested by Professor Trendelenberg. I have operated in this way twice. The first case was one of epithelioma, involving the floor of the urethra for its whole length, as well as part of the anterior vaginal wall and base of the bladder. The opening made in removing the growth was so large that, though I succeeded in bringing the edges of the hole which I had formed into apposition, the wound subsequently gaped, and a large vesico-vaginal fistula resulted. The chief interest in this case lies in the fact that in five weeks, without further treatment, owing to the efficient supra-pubic drainage, the fistula entirely and spontaneously closed. The second case was an ordinary one following labour, in which the operation was perfectly satisfactory.

CASE 1.—E. S.—, aged fifty, was admitted into the Leeds Infirmary under my care on Sept. 19th, 1889, suffering from retention of urine. For twenty-seven years she had taken laudanum (about an ounce and a half daily). Her health was good, and she had no urinary symptoms till five months before admission; she then noticed that she had difficulty in passing urine, that micturition was accompanied by pain, and that occasionally the urine was tinged with blood. The symptoms gradually increased in severity, till seven days previously she had complete retention; she has not been able to pass any urine, but has been relieved by a dribbling overflow. On admission, the bladder was found to be much distended. There was a hard, nodular mass, which extended from the urinary meatus on to the anterior vaginal wall; it involved the floor of the urethra and extended on to the base of the bladder. A female catheter was introduced with some difficulty, and several pints of urine were evacuated. The retention recurred. She was only relieved by frequent catheterism, and this caused much pain and some hæmorrhage. It was consequently determined to operate by removing the growth closing the vesico-vaginal fistula thus formed, and leaving a supra-pubic opening. On Sept. 27th, the pubes having been shaved, the patient, who was a very thin woman, was placed in the inverted position by hanging her by her knees to a cross-bar attached to an operating table and supporting her loins by pillows. Her head was placed towards a window, the full light of which consequently fell on the abdomen. The bladder was now distended with twelve ounces of a boracic acid solution. A transverse incision, about half an inch above the pubes and three inches in length, was made; this divided both skin and recti muscles. The bladder was exposed, fixed by a tenaculum and opened transversely; it was fixed to the deep part of the abdominal wall, and thus prevented from falling into the pelvis, by three sutures. The patient was next placed in the lithotomy position, and a duckbill speculum introduced into the vagina. The growth, pressed down by the fingers of an assistant passed through the supra-pubic wound, was removed by scalpel and scissors. It was more extensive than was expected. The lower two-thirds of the circumference of the urethra, as well as part of the base of the bladder, was implicated, and when the removal was complete, an opening, which would easily admit two fingers, had been made. This opening was closed by fine silk sutures passed through the vaginal wall. The edges were with difficulty brought together, and there was much tension on the stitches. The patient was now replaced in the inverted position, and the opening in the mucous membrane of the bladder was closed by fine catgut sutures. Lastly, the supra-pubic wound in the bladder was closed at each end, an opening being left large enough to admit a drainage-tube; the recti muscles were stitched together and the skin wound closed except at the centre. On injecting the bladder, it was found that the opening into the vagina was watertight. The pathological report made it certain that the growth was a squamous epithelioma. The subsequent history was as follows. On examination at the end of a week, it was found that the

<sup>1</sup> A paper read at the Medical Society of London, Nov. 3rd, 1890.

posterior part of the bladder wound had not united, and that a vesico-vaginal fistula, through which a finger could be passed, existed. The supra-pubic wound closed slowly, and the opening into the bladder was kept patent by a tube introduced at intervals. The bladder and vagina were irrigated twice daily through the supra-pubic opening with boracic solution. On Nov. 3rd, thirty-seven days after the operation, the opening between the bladder and vagina was completely healed, and all urine escaped by the supra-pubic wound. The patient was fitted with a urinal and sent to our convalescent home. On Jan. 4th, 1890, she returned to the infirmary, when it was found that urine still escaped by the side of the urinal tube. There was no recurrence of the growth. On Jan. 18th she was sent home.

CASE 2.—E. A. W.—, aged seventeen, was admitted into the Leeds Infirmary under the care of Dr. Braithwaite on Jan. 3rd, 1890. Knowing that I was interested in the subject, Dr. Braithwaite kindly transferred her to me. She was delivered by forceps on Nov. 23rd, 1889, after having been forty-eight hours in labour. Since then all urine has passed by the vagina. On examination the perineum was found to be lacerated to the anus. There was a vesico-vaginal fistula large enough to admit the tip of the index-finger situated immediately in front of the os uteri. On Jan. 11th the patient was placed in the inverted position and the bladder opened transversely and fixed to the abdominal wall, as described in the previous case. It was necessarily impossible to distend the bladder. A copper spatula was introduced into the bladder and its superior wall pressed upwards. A small electric light was placed in the bladder against the spatula and the whole of its interior and the fistula were perfectly illuminated. The fistula being fixed and pressed upwards by two fingers of an assistant introduced into the vagina, the edges were refreshed with great facility. Four chromicised catgut sutures were passed through the mucous membrane and the fistula thus completely closed. As a further safeguard the patient was placed in the lithotomy position and four fine silk sutures were inserted, including all tissues except the bladder mucous membrane. The supra-pubic wound was closed in three layers, bladder, muscles, and skin, an opening for a drainage-tube being left in the middle line. The after-progress was in every way satisfactory. On the fifth day the tube was removed, on the eighth she passed a little urine by the urethra, and at the end of a fortnight the vaginal sutures were removed. In less than a month the supra-pubic wound was completely healed, and on Feb. 13th she returned home passing urine naturally, and perfectly restored.

The operation which I have described above may, I think, be somewhat modified with advantage. I suggest that it be practised as follows:—1. The patient is placed in the inverted position.<sup>2</sup> As the bladder cannot be distended, and as the rectal bag would be of little, if any, use, it is advisable that the peritoneum be removed as far as possible from the pubes. This is best effected by the position adopted. In this position a side light best illuminates the interior of the bladder, or an electric light can be used with most advantage, and thus the subsequent steps of the operation can be carried out with ease and facility. 2. In the two cases which I have described I made, as Trendelenberg advises, a transverse incision. In future I intend making a longitudinal incision through the skin and linea alba, and opening the bladder in the same direction. If necessary, it will be easy to partially divide the recti, and thus obtain more room. It is true that with this longitudinal incision the view obtained of the interior of the bladder is not quite so good, and that manipulation in its interior is not so easy. On the other hand, my experience of eleven cases of transverse supra-pubic cystotomy has shown me that healing is, as a rule, much slower with a transverse than with a longitudinal incision. In cases like the one first related, where a supra-pubic urinal must be worn, the transverse incision is certainly inadmissible. The recti, if undivided, form a sort of sphincter and grip the tube introduced into the bladder, thus preventing the escape of urine by its side. If these muscles are divided urine will escape by the side of the tube, thus making the urinal comparatively useless. These remarks apply not only to cases of vesico-vaginal fistula, but to all cases of supra-pubic cystotomy. 3. The bladder

must be fixed by sutures to the deeper layers of the abdominal wall. These are easily introduced by large corkscrew needles in handles. The long ends of the sutures are not removed till the operation is finished. They prevent the bladder from being displaced from the abdominal wall, and they serve the purpose of retractors, opening the wound and facilitating a view of its interior. If expedient, a metal spatula may be introduced and used as a retractor with advantage. 4. The edges of the fistula are refreshed, care being taken to remove a complete ring of vesical mucous membrane, and of the bladder and vaginal walls. 5. Fine catgut sutures are passed through the mucous membrane from above, and the patient being placed in the lithotomy position silk sutures are introduced through the vaginal wall from below. In this way the fistula is completely closed by a double row of stitches. 6. The supra-pubic wound in the bladder and in the abdominal wall is partially closed, room being left in the middle line for the introduction of a large rubber tube. Supra-pubic drainage must be maintained till the fistula is firmly closed. It is this drainage which is the important factor in this operation. As the bladder cannot become distended, there will be no tension on the sutures which bring the edges of the fistula into apposition, and no tendency for the urine to become infiltrated into the wound. The cystitis which is apt to occur when a catheter is frequently passed or tied in the bladder will not be likely to occur, and if necessary the cavity of the bladder can be kept clean by free irrigation with a weak antiseptic solution. It may consequently be expected that in most cases the operation for the relief of vesico-vaginal fistula following labour will be successful at the first attempt. Case 1 makes me hope that cure may result even in the worst cases, for it shows that a large fistula will close without further treatment if the urine can escape freely through a supra-pubic opening.

In conclusion, it may be asked, Is there any need for this operation? My experience may be unfortunate, but I have seldom seen a vesico-vaginal fistula closed at one sitting. A small opening is not unfrequently left, and the discomfort of the patient is the same whether the opening is small or large. Not unfrequently the operation must be repeated several times before a perfect result is obtained. I have seen other cases in which repeated operation has failed to give relief. When this occurs the supra-pubic operation should undoubtedly be tried. My small experience does not warrant me in expressing an opinion as to whether it should be adopted in more favourable cases.

Leeds.

## CALCULUS IMPACTED IN THE URETER FOR TWENTY YEARS; REMOVAL; RECOVERY.

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I THINK that the following case is worthy of being recorded for two or three reasons—viz., the long duration of the symptoms, the smallness of the stone, and the difficulty which may be experienced in finding a stone in the ureter by the lumbar incision.

E. A. W.—, aged twenty-three years, was first affected by attacks of violent abdominal pain when three years of age. This pain she referred to the lower part of the abdomen on the left side. These attacks recurred since at intervals of about a month. When she was eight years old she had an attack of hæmaturia that lasted for a week. At twenty-one she had another similar attack. Recently the pains have become much more violent and frequent, coming on two or three times in a week. She was admitted into Dorcas ward under the care of Dr. Horrocks, and from that was transferred into Mary ward under Dr. Goodhart. She was carefully examined by both these gentlemen, who found nothing abnormal, Dr. Goodhart being of opinion that she was probably suffering from calculus in the kidney. She was transferred to a surgical ward under my care.

During the period she had been in the hospital she had had several attacks of pain which were very violent in character. She referred it to the left loin and to the lower portion of the abdomen on the same side. Associated with this there was very great irritation in the urethra, which was increased by micturition. The amount of urine passed varied, its average quantity being about 25 oz., and the

<sup>2</sup> The patient is easily inverted by means of a T-shaped support attached firmly to the end of an operating table. The height of the support can be changed by a crank which works the upright. We use Verity's patent epicycloidal window holder, which is firm and self-fixing for this purpose, and find it convenient. In private practice the patient can be inverted over the top of an ordinary small iron bedstead.