ON PRIMARY RESECTION OF GANGRENOUS INTESTINE.

By ARTHUR E. BARKER, F.R.C.S.,

Professor of the Principles and Practice of Surgery at University College, London; and Surgeon to University College Hospital.

THE question as to the line of action to be adopted in cases of gangrenous strangulated hernia is still, I believe, a matter of anxious doubt to most surgeons. Three courses are open to us in such cases:

1. We may simply incise the gangrenous loop and establish a permanent artificial anus, thereby obviating the risks of obstruction otherwise certain to terminate in death.

2. We may perform the same operation, and when the dangers of the primary condition are past, proceed to rid the patient of the unpleasant and often dangerous intestinal fistula by subsequently resecting the part of the bowel involved and restoring its continuity.

3. Lastly, in a given case of gangrenous hernia we may at once proceed to do a primary enterectomy, removing the dead loop and restoring the track of the tube once more.

Which of these courses we shall adopt depends in the first place upon the view we take as to the relative risks of each. On this point it is difficult to speak with certainty. But my own observation in many cases is leading me more and more to the conclusion that with our improved methods of intestinal anastomosis the latter course is the best, where the patient is not too exhausted. For the dangers of the first course are admittedly considerable both immediately and remotely. And although in the past they compared favourably with those of primary and secondary resections, it is a question whether at present they should be regarded as slighter in the main. Probably a good deal depends upon the selection of cases in regard to this point. Aged people exhausted by prolonged vomiting and restricted food will most likely be better treated if an artificial anus be made at once, to be followed, if possible, by secondary resection of the bowel and junction of the two ends, while in younger and stronger cases a primary resection will be more suitable. But, above all, this question will be influenced by the surroundings of the patient who is to be operated on. If these be bad, no doubt the simpler operation ought to be selected. But if the surgeon have at his command all the necessary conditions for treating such a case according to the most approved methods, both before, during, and after operation, the results of primary resection may prove as perfect as those of any other surgical procedure, the after-history being simple, and the functions of the bowel perfectly unimpaired.

The last two cases in which I have been called upon to operate for gangrenous hernia illustrate this very well, and appear to me to deserve record.

CASE I.—PRIMARY RESECTION OF GANGRENOUS HERNIA: RECOVERY.

Mrs. H., aged 46, was admitted into University College Hospital, on June 2nd, 1899.

History.—The patient was a healthy woman with a good family history. On May 31st she was seized with violent pain in the abdomen at about 8 P.M., and had sickness and diarrhoea all night, the vomit becoming foul next morning, while the diarrhoea ceased. The pain was felt most in the left groin. On admission a tight left femoral hernia was found.

Operation.—June 2nd, 1899, 9 P.M. On exposing the sac it was found gangrenous as well as the intestine, and great care had to be exercised lest the peritoneum should be infected. Both structures were well drawn forwards, and the sac was cut away in healthy tissue. After thorough drying out of the area of operation, and washing with mercury perchloride (1 in 1,000), and again drying, the intestine was drawn out, and 9 to 12 inches were clamped with a Doyen's forceps, the afferent and efferent portions of the loop lying side by side. The loop was now cut away close to the mesenteric attachment. The orifices of the intestine were then cleansed with 1 in 1,000 bichloride solution and dried, and their approximated edges stitched together with fine silk passing through all the coats. The same continuous suture was then passed through the opposite edges until the lumen was closed, and the two ends of silk were tied where they met. A second continuous silk suture was now carried round outside and close to the first, but this time only including the muscular and serous coats. The edges of the divided mesentery were now sutured by continuous silk suture, and after final cleansing and washing with normal salt solution were allowed to drop into the abdomen. As the sac had been found to be gangrenous a wisp of iodoform gauze was inserted into the abdomen through its neck, and the wound was stuffed with the same, only the upper and lower angles being sutured.

After-History.—The patient bore the operation well, and had no bad symptoms. The packing of the wound was removed on the fourth day, and the wound was found clean. There is nothing further to record except uninterrupted recovery, the wound healing by granulation. Feeding was begun at once by the mouth, and soon increased to solid

and abundant diet. She left the hospital on July 20th, looking and feeling quite well. The portion removed was about a foot in length.

CASE II.—PRIMARY RESECTION: RECOVERY.

History.—E. K., aged 20, was seized on Monday, June 12th, 1899, with severe pain in the abdomen while eating. He went home, and was seen by a doctor, who gave him some medicine, but he vomited it up at once. Next day he was advised to keep his bed. On June 14th he was told he had a rupture, but the doctor was unable to reduce it. He was again seen by the doctor on June 15th, but no attempt was made to reduce the hernia. On June 16th the latter was larger, and the patient was sent to hospital. He had been vomiting ever since Monday.

Condition on Admission.—June 16th, 1899. The patient was a fine, healthy young man. The abdomen was found to be distended but not tender. There was a large hernia in the right inguino-scrotal region, very hard, and showing no impulse on coughing. The temperature was 100.6°.

Operation.—He was operated on at once through the usual incision. The sac contained blood-stained fluid. The knuckle of intestine $\frac{2}{3}$ inches long was bluish black, and almost gangrenous. The wound in the abdominal wall was enlarged, the gut was pulled out, and the upper part where it was quite sound was laid side by side with the efferent part, where it was normal though greatly reduced in size. In this position both were clamped together accurately with Doyen's forceps, the blades of which ran along the mesenteric border of the loop to be removed. When the latter had been surrounded with aseptic gauze the loop was cut away with scissors from the mesentery. The edges of the latter were then sewn together with fine silk by the continuous method. The approximated edges of the two ends were then stitched together with a continuous silk suture which passed through all the coats of the bowel, special care being directed to the mesenteric angle. The same suture was then carried through the opposite sides of the intestinal edges in the same way, and the silk was tied to the first end, purposely left long. Then the forceps were removed, and a continuous silk suture was carried round the intestine over the first, but only including the serous and muscular coats. After washing the line of suture first with 1 in 1,000 bichloride solution, and then with sterile normal saline lotion, and when carefully dried with sterile gauze the loop was replaced. The sac was then drawn down, tied at its neck, and cut away. A radical cure was now done by Bassini's method, and a sterile dressing applied.

After-History.—The patient bore the operation well, and had 300 c.cm. of normal saline solution injected hypodermically immediately after. He was very restless subsequently, requiring morphine. Rectal feeding was at once begun, and continued daily. On the fifth day he was fed by the mouth every two hours, and on the sixth each hour. From the ninth day on he had light solid food. On this day the wound was dressed for the first time. The upper two stitches had suppurated; the rest of the wound was healed by first intention. On the thirteenth day the patient had a copious motion, and was soon quite well except from a small granulating spot at the seat of the suppurating stitches. He went home on July 14th, and came to show himself on July 26th. He was in robust health, and unconscious of any abnormality in his abdomen. The bowels acted well. The loop of intestine removed measured 30 to 36 inches.

As to the factors which appear to me to contribute most to a successful result, they may be divided into: (a) The preliminary treatment of the patient before the operation; (b) the details of the operation itself; and (c) the after-treatment.

(a) *Preliminary Treatment.*—In all cases where there has been stercoraceous vomiting the stomach should be washed out with a tube and funnel with warm brandy and water until quite clean. The patient should then be wrapped from head to foot in warm flannel or wool and lie between two hot bottles, with another between his legs. The area of operation having been cleansed and shaved in the usual way, should be covered with aseptic gauze, so that the intestine drawn out shall not come in contact with the skin, and so that any septic fluid from the latter shall not run back into the wound or abdomen. With feeble individuals, if not in all, it is desirable that hypodermic transfusion of warm normal saline solution should be provided for throughout the operation to make up for the fluid lost by vomiting, sweating, and lung exhalation. This is easily carried out by an assistant with an aspirator needle thrust into the areolar tissue of the arm, and connected by a tube with an elevated glass vessel holding the solution. Besides this it is well to give a copious enema of hot water and brandy. By these means the shock of the longest operation may be minimised. Local analgesia with eucaine beta should be used with all but the most excitable individuals. With such I prefer chloroform.

(b) *The Operation.*—Here everything which saves time is of the utmost importance. When the bowel is reached it must be drawn well out until a part is reached where the coats are perfectly healthy. In Case II I had to resect about a yard or so. This loop must be packed round with aseptic gauze most carefully. It is then emptied by pressure and clamped. Nothing is better for this purpose than Doyen's forceps, the long blades of which should run close to the mesenteric attachment, and across the two lumina of the afferent and efferent tubes first placed accurately side by side, the smaller efferent tube being spread out as much as possible to corre-

spond with the larger afferent. The loop is then well wrapped in sterile gauze, and removed by scissors cutting along the mesenteric border and obliquely across the two tubes, so that the free margin of what is left is shorter than the attached. The two adjacent open lumina are then wiped dry with sterile gauze, and mopped with 1 in 1,000 sol. hyd. bichlor. and later with saline solution. The ends are then united without removing the forceps, as described in Case II. Murphy's button, of course, may be employed, but after a considerable experience of it I must say I have more faith in silk suture. Before dropping the sutured bowel back into the abdomen, the exposed portion should be gently washed with saline solution, and carefully dried. In all these manipulations every kind of irritation of the gut or peritoneum with strong germicides must be studiously avoided. If they are used at all it should only be to the cut edges of the bowel. As to whether the abdominal wound should be closed or drained, it is quite impossible to lay down rules. In Case I it was stuffed with iodoform gauze for a few days, and then allowed to granulate up; in Case II I did a radical cure by Bassini's method at once. But in the last case the sac was not in a state of gangrene as in Case I.

(c) *The After-treatment.*—I venture to think that hypodermic transfusion of saline solution twice a day to the extent of a pint or so each time is an important factor in after-treatment, and it has proved of great use in many of my other abdominal cases. Nutritive enemata every four hours, and hot water enemata every four hours, alternating with the last, have for many years been a routine treatment in all my case of abdominal operation. But in these special lesions I believe that cautious feeding by the mouth may be begun at once.

All these factors require to be carefully taken into account and provided for before the operation is begun to obtain the best results. Where many of us have made the most serious mistakes in the past has been in the too free use of strong germicides on the peritoneal surfaces, and in removing too little of the intestine.

FRACTURE OF THE SPINE IN THE LOWER DORSAL REGION :

OPERATION FOUR YEARS AND A-HALF LATER : PARTIAL RESTORATION OF WALKING POWERS.

By NOBLE SMITH, F.R.C.S. EDIN., L.R.C.P. LOND.,

Senior Surgeon to the City Orthopædic Hospital, and Surgeon to All Saints' Hospital for Children, London.

E. W., aged 22 at the time of the accident, was training in the West Cumberland Hussars on June 1st, 1893, when his horse reared, fell back, and crushed the rider, who was also dragged for some distance, one of his legs being retained in the stirrup. He remained paralysed from his waist downwards. I first saw him in August, 1896, three years and two months after his accident. He was then at the Home for Incurables at Carlisle, and was in a very weak state of health. There was an acutely angular projection of the tenth dorsal vertebra. He had very slight power of flexing the left thigh upwards as he lay in bed, but the lower limbs were absolutely useless to him. There were several bedsores, which had commenced a few months after the accident and had continued more or less since, and other symptoms of paralysis which I will describe later. It was obvious, from the fact of his having lived so long, and of their being some movement in the left leg, that the cord was more pressed upon than crushed, and I suggested that laminectomy, to relieve that pressure, was desirable.

The patient was very anxious to have everything done that could be for him, but for various reasons he was unable to come to London until January, 1898, when he was admitted a patient under my care in the City Orthopædic Hospital, Hatton Garden. His condition was then found to be as follows:

There were several old scars from bedsores, as well as the open sores. Complete anæsthesia and analgesia of the whole of the right inferior extremity, with the exception of the upper third of the front of the thigh, where the patient detected both touches and pricks. Sensibility was not so much affected on the left side, the patient being able to detect touches and pricks above the level of the knee, both in front and behind,

and over a limited area below the knee, in front and on the inner side of the leg. Below this level there was complete anæsthesia and analgesia. There was no blunting of sensibility of the trunk, the muscles of both limbs were greatly wasted, and there was considerable contracture of the calf muscles, both feet being extended and the heels drawn up. There was also some amount of "varus," especially on the left side, and the toes were bent towards the soles of the feet. This contracture of the toes in the flexed position had been more marked on the right side than the left, and most marked in the great toe, but diminished in degree towards the little toe. There was complete inability to move the toes of either foot or the feet at the ankle-joints. The right leg could be slightly drawn up in bed, flexion at the hip and knee-joints thus resulting, but there was no power of extending the limb at the knee-joint, so that the heel could not be raised from the bed. The power of movement, which was preserved in this limb, was only very slight in degree. There was somewhat greater range of power of movement on the left side, shown by ability to draw up that limb in bed, flexion of the hip and knee resulting. There was slight power of extension at the knee-joint, so that the foot and heel could be raised off the bed to some extent.

Reflexes.—The plantars were both absent as well as the knee-jerks, and there was no ankle clonus. There was complete loss of control over both sphincters. The patient was in a very emaciated condition; for some months he had been failing as regards his general health, and was able to take but little nourishment. He was suffering from cystitis.

Operation.—On February 5th, 1898, I operated, with the assistance of my colleagues, Mr. Jackson Clarke and Mr. Chisholm Williams, Mr. John Poland also being present. I cut down to the spine, exposed the laminae of the tenth, eleventh, and twelfth dorsal vertebrae. The arches of the eleventh and twelfth were united together by callus, and were pressing slightly upon the spinal cord. One pointed fragment penetrated the membranes, and upon this being removed a small opening was left, which permitted the escape of cerebro spinal fluid. The cord seemed to be then quite released upon pressure, and I closed the wound. The extremely weak condition of the patient was doubtless the cause of his suffering seriously from collapse, but he recovered in this respect during the night. The wound healed up rapidly, and a few days after the operation I applied a splint similar to that which I have used successfully in spinal cases. The general condition of the patient began to improve within a fortnight after the operation. The bedsores gradually healed up, and the functions of the bladder and bowels began to improve, so that on March 30th I was able to report that during the last fortnight he had regained control over the bladder, to the extent that instead of the urine dribbling away constantly he was able to retain it half an hour at a time, and was perfectly conscious when he wished to pass it, a condition which had not previously existed since the day of the accident, four years and a half previously. As regards the bowels, he was now perfectly conscious as to their action, but the paralysis of the sphincter ani remained. From this time forward the patient improved in every way, until, ten months later, massage was commenced. After about two months of this treatment the patient had gained so much control over the limbs that I contemplated getting him on to his feet. Both feet were in a position of extreme equinus, and it became necessary to divide the tendo Achillis on each side, and place the feet in a position of right angles with the leg. Although the parts felt inanimate and lifeless, yet the healing process took place perfectly, and upon January 18th, 1899, light steel instruments were made to support the right foot and knee and the left ankle, and with the help of these he commenced his attempts to walk. The process was of course a slow one, but on January 22nd he was able to walk across the ward with the assistance of the nurses. By February 1st he was able to work a few steps by himself with the assistance of two chairs, and on February 15th he managed to extend his walk without assistance from one ward to another. He was located for the time at Dr. George Stoker's Oxygen Home, where he had been kindly taken in during the rebuilding of the City Orthopædic Hospital. On March 8th he informed me that he had been able to walk into the next ward and back again three times