obvious that no attempt should be made to close the colotomy until the original wound in the rectum is quite soundly healed, and, in fact, it is wise to postpone the operation till all the wounds are healed, whether they communicate with the bowel or not.

First Method.

By destruction of the spur.—For this an enterotome is required. The two best forms of this instrument are one in which a male blade fits into a double female blade, the blades being made of thin steel and with a waved edge, and a second form with ribbed parallel blades in which one blade is provided with spikes which fit into holes in the opposing blade. The enterotome should be put on as follows: The first and second fingers of the surgeon's left hand are passed into the bowel, one finger in the upper and one in the lower opening, and are moved about until only the double thickness of bowel wall can be felt between the fingers. The enterotome, with the blades open, should then be passed into the bowel along the fingers with one blade in each portion of bowel, the fingers acting as guides. At least 3 to 3½ inches of the spur should be caught between the blades at the first application, and the blades should then be screwed firmly together to prevent any possibility of slipping. The spur must be completely divided for from 3 to 4 inches, rather more, in fact, than appears to be necessary. This is to allow for cicatricial contraction in the subsequent join. If possible the spur should be completely removed, so that no spur at all can be felt after the instrument is separated. This will certainly require more than one application of the enterotome. I have never known it to take less than two applications. The screw at the back end of the enterotome should be tightened up each day until it is as tight as it will go. The instrument generally causes a certain amount of pain during the first 24 hours for which, if necessary, morphia must be administered. It takes from four to five days for the instrument to become loose, and a day or two should then be allowed to elapse before applying the instrument to what is left of the spur. When the spur has been completely divided an operation should be done to close the external opening. The mucous membrane should be separated from the skin and muscles and inverted with catgut sutures, and the muscles and deep parts closed over it, also with catgut. As there is considerable risk of sepsis it is advisable to provide a drain. The drain, however, should not be placed through the original wound, but through a stab wound made 2 inches away from the primary wound. As a rule, by this method, which is comparatively safe and easy of application, primary union is secured. It will certainly fail, however, unless the spur is very thoroughly divided.

Second Method.

By immediate resection.—The two risks of this method are leakage from the line of union, which is necessarily inside the peritoneal cavity, and sepsis. It is obviously not easy

to be certain of sterilising the skin of the abdominal wall and the mucous membrane of the colotomy opening, and failure to secure this will result in peritonitis or sepsis in the wound. The bowels having been previously thoroughly cleared, the abdominal wall and the mucous membrane of the colotomy opening should be well iodined. The mucous membrane of the opening should then be carefully dissected out and closed with silk sutures. The wound should be dabbed over with iodine again and the instruments and gloves changed. The wound should then be deepened on one side until the peritoneal cavity is reached and opened. With one finger inside the abdomen the bowel should be separated from the skin all round with scissors and the loop

drawn well out of the abdominal cavity. The whole wound area should then be carefully packed off with towels or large swabs. No attempt should be made to stitch up the original opening in the colon, but the involved portion of colon should be cut out by a V-shaped resection, the apex of the V being towards the mesenteric attachment and the base containing the original opening (see illustration). It will generally not be necessary to cut through the bowel at the mesenteric attachment, but those portions opposite the mesenteric attachment should be freely cut away on both sides of the opening. It will be seen that the bowel is cut across very obliquely; this ensures a good and uniform blood-supply to the whole of the cut edge, which would not be the case if the bowel were cut transversely. It also ensures the lumen of the bowel at the point of union being, if anything, larger than the normal lumen, which compensates for any subsequent contraction of the line of suture. The two ends of the bowel are now accurately sewn together with catgut. The suture should be started on one side of the bowel and carried first across the mesenteric attachment to the opposite side and should take up all the coats. It finishes at the point where it began, and a peritoneal stitch is subsequently put over the first line of union in order to make all secure. The bowel is then dropped back into the abdominal cavity; the ragged hole in the abdominal wall, where the original hole was, is trimmed up and sewn together in layers. It is advisable to provide drainage either by means of a small tube or, better, by a piece of rubber tissue an inch wide passed well down to the back of the abdomen on the outer side of the colon and drawn out through the lower end of the incision. This drain can be shortened on the second day, so that it only passes through the thickness of the abdominal wall. Drainage is necessary because *B. coli* infection in the neighbourhood of the anastomosis is very difficult to avoid with certainty, and if drainage has not been provided may cause very serious trouble. The colon bacillus is always present in large numbers in the sigmoid, whereas the small intestine contains few infective organisms; consequently drainage is not necessary when joining up the small bowel, but always advisable when dealing with the large bowel.

After this operation the bowels should be opened on the second day, either with a small enema or a dose of salts, and be kept acting daily. There is no advantage in locking up the bowels for a long time, and the dangers of subsequent trouble are much greater if the patient is once allowed to become constipated.

Hyde Park-place, W.

Clinical Notes:

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

A NOTE ON THE USE OF "BIPP" FOLLOWING THE OPERATION OF BONE-GRAFTING.

BY H. STEWART BRANDER, M.D. ABERD.,
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Albee's admirable and fascinating book on bone-grafting will undoubtedly be of great service to surgeons at the present time. The technique of the operation of bone-grafting rendered necessary by the character of wounds caused by modern projectiles requires careful consideration owing to the fact that in these wounds cicatricial tissue is often extensive and the blood-supply consequently poor. Seeing that one must undermine the scar tissue in order to expose the ends of the bone to be grafted, and at the same time avoid the well-known risk of re-lighting infection in a wound which has been healed for months, I venture, in order that it may possibly be of help to some other surgeons, to record my experience with the use of "Bipp" following a bone-grafting operation. This I do because, in my opinion, the strictest aseptic precautions *alone*, are not always sufficient. The following is a history of the case:—

Corporal, R.A.M.C., aged 26 years, wounded by shrapnel at the Lancashire landing, Gallipoli, on July 11th, 1915. Transferred to a military hospital in this country on July 27th, 1915. Patient had a compound fracture of left radius. Skiagram showed radius fractured in two places—viz., about junction of middle and upper thirds and at

junction of lower and middle thirds. From the history of the case it is evident that there was much purulent discharge from the wound due to necrosed bone. The sequestrum was removed on Oct. 13th, 1915, and the wound healed about eight weeks afterwards. Patient was discharged from the Army on June 8th, 1916, as medically unfit. As a Chelsea pensioner he applied for treatment at the War Hospital, Keighley, and was admitted under my care on Nov. 13th, 1916. On admission to this hospital there was a healed scar 4 in. by 2½ in. on the extero-anterior aspect of the left forearm. The scar was very adherent to underlying structures. There was marked wrist-drop and apparently considerable loss of muscular tissue. The proximal and distal ends of the radial fracture could be readily felt at about a distance of 2 inches from each other. This was also well seen in skiagram.

Employing strict aseptic precautions, I operated on Nov. 26th, 1916. I took the graft from the tibia and followed Albee's technique throughout, except that a Hey's saw was used instead of the motor-driven circular-saw used by him. A long, curved incision was made on the front of the forearm well away from the scar. This was completely undermined and found to be adherent to the fractured ends of the radius, most of the muscular tissue in the proximity of the fracture having been destroyed either at the time patient was wounded or had subsequently sloughed. On completion of the operation the forearm was put up on a splint midway between pronation and supination. At the end of a week I dressed the wound for the first time and found that, although the skin incision had healed by first intention, part of the original scar tissue about the size of a five-shilling piece had sloughed, exposing about an inch of the graft. My first impression was that the operation was doomed to failure. Employing very strict technique according to Rutherford Morison's method, however, I "Bipped" the sloughing surface and renewed the "Bipp" every ten days, with the result that the skin wound is now (nine weeks after operation) healed and the union of the graft to radius strong. Skiagram shows the graft in excellent position.

Having had excellent results with "Bipp" in compound comminuted fractures, hernia cerebri, &c., its use after this bone-grafting operation suggested itself to me. In this connexion I wish to take the opportunity of thanking Lieutenant-Colonel Sir Berkeley Moynihan for advising and encouraging me, on one of his official visits of inspection at this hospital, to persevere with "Bipp" in the treatment of troublesome comminuted fractures; also Colonel Robert Jones for the opportunity he gave me of seeing a bone-grafting operation at the Military Orthopaedic Hospital, London.

War Hospital, Keighley.

A NOTE ON THE SUTURING OF FRACTURED BONES BY ABSORBABLE LIGATURES.

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THIS preliminary note refers to a method first worked out upon isolated bones which were specially broken for the purpose, and upon the broken limbs of cadavera. No one should attempt the method in a living patient until he has tested it for himself and practised the technique on dead bones (human or other animal). The union is not very strong, but it is claimed that, in conjunction with careful splinting, it will maintain the fragments in accurate apposition in selected cases.

The method may be illustrated by taking the instance of an oblique fracture of a long bone. After an incision has exposed the fracture two oblique cuts, at right angles to the

Rough sketch showing the fractured bone sutured with catgut. The fracture is indicated by the dotted line.

fracture line, are made on the surface of each fragment. These are easily made on the more exposed fragments by means of a hack-saw and on the deeper or more buried fragments by a Gigli's wire-saw. Two stout ligatures of chromicised catgut, guaranteed to resist absorption for at least 30 days are slipped into the grooves and knotted tightly. A third ligature uniting the two oblique ones is employed to tighten them still further (see diagram). It is absolutely essential that the ligatures be very tightly

drawn. For this reason the ends of the catgut must be clamped in artery forceps so that a maximum force can be used in tying the knots. The wound is then closed and the limb placed in appropriate splints.

The method has the following advantages over the use of plates and screws: (1) The operation is much more speedy and requires no special instruments; (2) no foreign body is left in the tissues such as may provoke an effusion of lymph, favouring the occurrence of sepsis, or, at a later period may set up rarefying osteitis and a permanent weakness.

NOTE ON THE USE OF PHYLACOGEN IN PUERPERAL SEPSIS.

BY J. H. REYNOLDS, M.B., C.M. EDIN.

THE following two cases may prove of interest to those who are so unfortunate as to run up against puerperal sepsis, and are not near enough to a laboratory to have a vaccine prepared, or cannot wait for it.

CASE 1.—Patient, aged 26, married, a strong healthy primipara. On Dec. 12th, 1913, she had been in labour some hours before I was called, and was disappointed in her nurse, but was satisfied to have the services of a friend whom I found sitting on the bed clad in a greasy old fur motor-coat. It subsequently transpired that she was waiting to go into hospital with a view to operation, the history suggesting tubal mischief. I at once borrowed the nurse from another case near by, who was perfectly satisfactory, and the confinement took place in a normal manner. Only two examinations were made, one on first seeing the patient, and the other after the liquor amnii was expelled. On the third day the pulse became more frequent, on the next the temperature started to rise, and intra-uterine douches of peroxide were given twice daily. In spite of these and other measures, the disease ran a severe course, and on the thirteenth day a clot was detached from the placental site during douching and lodged in the lower lobe of the left lung. She collapsed at once, and began to cough violently, later on bringing up bright blood and mucus. That decided me to try mixed infection phylacogen (P. D. and Co.), and I was able to inject some that afternoon. The symptoms improved with astonishing rapidity, and on the fourth day of the injections the patient was not only out of danger, but well on the way to recovery.

CASE 2.—Patient, aged 30, married, primipara. Five days before confinement, which occurred recently, her nurse brought her to me and called my attention to a mammary abscess. This was opened at once and swabbed out with chloroform. It healed before the confinement, which started with vomiting and weak pains which died away. Several small abscesses were noted on the buttocks and were painted with tr. iodi. After 24 hours the patient had a frequent and weak pulse, so she was given an injection of morphia and atropine which induced a few hours sleep; food could then be taken. The pains set in more vigorously but were not very strong, and as soon as the os was sufficiently dilated the membranes were ruptured, allowing the escape of a large amount of liquor amnii. Pains became more vigorous and the head reached the vulva, but after an hour so little progress was made that the child was delivered by forceps; its weight was 10½ lb. I had to wait three-quarters of an hour for the first pain after that, and expressed the placenta, as with the pain there was free hæmorrhage. It came away entire. From the first day the temperature was elevated and well within 24 hours the lochia were offensive. Much the same treatment was followed out as in the previous case, but on the seventh day, as the temperature reached 102°F., I decided to use phylacogen again, and started injection on the following morning. After two injections all untoward symptoms ceased and on the third day the patient's condition was that of a woman who had had a normal labour.

Of course, two swallows do not make a summer, but these are the only occasions on which I have needed phylacogen. The first case was losing ground till it was used, and the result was wonderful. In the second the patient, like the first, was a strong woman, but in this case I had the advantage of an excellent nurse. There is no doubt in my own mind that this was a case of primary inertia which passed into secondary. It is true that the symptoms were not nearly so severe, as she never had a rigor, although she felt very cold the day before I used the phylacogen. Still, the fact remains, as her chart shows, she made no real improvement till phylacogen was used, and I was nervous about her, because, rightly or wrongly, I looked upon the case as an infection before delivery—a condition I had never seen before.