ANASTOMOSIS TUBES FOR RESECTION OF THE COLON

BY

NORMAN C. LAKE, M.D., M.S., D.Sc., F.R.C.S.

Senior Surgeon, Charing Cross Hospital

The removal of portions of the colon by the method described by Paul in 1895, and subsequently by Mikulicz in 1902, is universally acknowledged by surgeons to be an admirable and life-saving procedure. It is true that while some operators regard it as being applicable to all parts of the colon others would restrict its use to those parts of the bowel that are normally mobile, such as the sigmoid loop. It has been objected, too, that the extra-abdominal method of colon resection for growths (by far the most frequent indication) is likely to result in a too limited removal both of the bowel itself and of the lymphatic drainage area. Despite these criticisms, however, the average surgeon finds many opportunities of performing the operation. It is not the object of this short communication to discuss the pros and cons of the method, for these have recently been fully laid out in the excellent presidential address of Zachary Cope to the Surgical Section of the Royal Society of Medicine (*Journal*, January 27, 1940, p. 143).

One difficulty, and even danger, of the operation has been the re-establishment of the continuity of the bowel lumen by crushing the spur. Cases are on record in which the clamps used for this purpose have penetrated the peritoneal cavity; in others a coil of small intestine intruding between the colonic loops has been included in the crushing. In a considerable percentage of cases the resulting fistula has to be closed by a second operation involving the peritoneal cavity, and so not devoid of risk; indeed, some surgeons advise that bowel continuity should always be re-established by open operation.

To overcome these difficulties many different types of clamps have been devised. In the address mentioned above Cope describes an ingenious apparatus in which the tubes themselves form the clamp. This instrument avoids many of the dangers, and I have followed its successful use in several cases with interest and admiration.

Experiments with a New Appliance

For the past three years I have been experimenting with an apparatus in which the tubes are used to create a true anastomosis between the two bowel loops below the level of the abdominal wall—that is, intraperitoneally. The use of this instrument has proved so satisfactory in a series of ten cases that I now venture to suggest it as an improvement in the technique of the Paul operation.

The illustrations (Figs. 1, 2, and 3) reveal, better than words can express, the essential character of the appliance. It consists of two slightly curved metal tubes which can be hinged together in a predetermined position by a clamping screw. On the opposing aspects of the lower ends of the tubes are oval apertures having raised rims, one of them being a single rim which can fit into the double rim on the other tube. After resection of the colon and mesentery the tubes are inserted one into each free end of the bowel in place of the usual Paul's glass tubes. They are then fixed together by the clamping screw in such position that the peritoneal surfaces of the two bowel loops are held lightly in apposition. As an extra precaution a few sero-muscular sutures can be applied where the peritoneal surfaces of the two loops

come into contact. The tubes can be attached to the bowel in the same way as Paul's tubes would be fixed—that is, by a simple tape ligature or, if time allows, by an inverting suture. The usual rubber tubing is fixed to the outer ends of the tubes.

The abdominal wall is now closed around the tubes so far as is possible, the cut edges of the bowel being

FIG. 1.—The apparatus ready for insertion. The tommy bar for the clamping screw and the screw for approximating the apertures are shown.

FIG. 2.

FIG. 3.

FIG. 2.—The assembled instrument with the tubes separated.

FIG. 3.—Diagram showing position of tubes relative to the abdominal wall. In a fat patient less of the tubes would appear externally.

usually level with the skin. Five days later the clamping screw is loosened, and by another screw mechanism the outer ends of the tubes are spread apart. This movement forces the single rim into the double rim. The two layers of bowel thus enclosed are cut off from their blood supply and so undergo necrosis. The clamping screw is again tightened with the tubes in their new position. After a further four or five days the appliance is taken apart and the tubes are easily removed. At this time the insertion of the finger into the fistula will show that the anastomosis is already formed. For a variable period the faecal fistula persists, but as the bowel starts to function normally the sinus closes.

It will be obvious that the apparatus is capable of considerable modification to suit the ideas of the individual surgeon. Thus the tubes may be made of unequal size and either smaller or larger than the standard size. The size and shape of the anastomotic apertures and the mechanism for forcing the tubes together can be changed without affecting the principles of action of the appliance. Indeed, that used successfully for the first three cases of the series was a home-made apparatus in the construction of which I had the valued assistance of Mr. Elson, the theatre mechanic at Charing Cross Hospital. The instrument here illustrated was made in stainless steel by Messrs. Allen and Hanburys; it was employed in the other seven cases.

That the anastomosis is an adequate one is shown by the barium enema film (Fig. 4) taken six months after

FIG. 4.—Barium enema of a case six months after operation.

operation. It will be noted that the two culs-de-sac, representing the original out-drawn loops, have retracted into the abdomen and are rapidly diminishing in size.

Results

The results in the ten cases are as follows. One patient died shortly after operation of a fulminating chest complication. In this case a preliminary blind caecostomy had been performed for complete obstruction three weeks previously. The remaining nine cases all did well. In eight of them one operation only was necessary, the fistula closing spontaneously at periods varying from six weeks to six months. In the ninth case the growth had already invaded the abdominal wall and formed an abscess therein when first seen. At a preliminary operation the abscess was drained and the diagnosis was confirmed by microscopy. A few weeks later the bowel was resected with a portion of the abdominal wall; the tubes were then inserted. Despite the patient's emaciated condition the anastomosis was established in the normal time. The resection of the abdominal wall in an emaciated patient, however, prevented both the falling in of the skin edges and the retraction of the bowel ends into the deeper layers, with the result that a permanent mucus-lined fistula was established. This produced a small amount of faecal leakage. A year later the patient submitted to a slight operation for closing this; the operation was performed without opening the peritoneum, there now being plenty of fat present to interpose between the closed bowel and the skin.

Some infection of the open part of the wound around the tubes almost invariably occurs, but in no case has it proved serious. I have lately been using the sulphonamide preparations prophylactically in these cases with, I think, some benefit. I have not seen any bleeding accompany the necrosis of the portion of the bowel wall,

nor has this necrosis extended beyond the limits of the pressure rims on the appliance.

Summary

A new instrument is described for use in extra-abdominal (Paul's) resection of the colon in which the drainage tubes themselves are made to perform the anastomosis after sufficient time has elapsed for the peritoneal surfaces of the two apposed loops of bowel to become adherent. In this way the dangers associated with the application of the ordinary clamp are avoided. In the majority of cases one operation only is necessary for the complete procedure.

VOLKMANN'S ISCHAEMIA

OBSERVATIONS AT OPEN OPERATION

BY

E. BELL JONES, M.Ch. (Orth.), F.R.C.S.

Orthopaedic Surgeon, East Suffolk and Ipswich
Hospital, Ipswich

The following case has afforded a study of the living pathology, and seems to be of importance in providing data for discussion of the cause and treatment, of this serious complication of fractures about the elbow.

Case Report

A child aged 10 had a severe injury of the elbow at 2 p.m. and was admitted to hospital at 6 p.m. A radiograph showed a supracondylar fracture of the humerus with marked backward displacement. There was intense swelling about the elbow, with deformity. The fingers were swollen, powerless, painful, numb, and livid. No contractures were present, but straightening the fingers caused severe pain. The radial pulse was absent. A diagnosis of an early stage of Volkmann's ischaemia was made.

Reduction was carried out at once, in accordance with the accepted view that full correction of the bony deformity prevents the onset or aborts the condition. A radiograph showed full reduction. At 10 p.m. there was no improvement in the fingers, and operation was decided upon. The alternative was to elevate the limb and reduce flexion of the elbow. Though this is a common method of dealing with the complication it seemed illogical as likely to displace the fragments and a contradiction of the generally accepted primary necessity for full reduction. The region was disclosed by an antero-external incision lateral to the biceps tendon.

Operative Findings and Procedure.—(1) There was no blood clot in the antecubital space. (2) The venous junction of the superficial and deep veins in this region was not compressed but shared in the general venous engorgement. (3) The muscle bellies of the flexor groups arising from the internal and external epicondyle were blue-black in colour. Division of the overlying fascia was carried out, and resulted in considerable improvement in the colour of the muscle. (4) The median nerve was similarly congested. (5) The brachial artery presented the most interesting features. At a point two inches above the elbow-joint there was a sudden change in its normal calibre to that of a thread: this change continued into the radial and ulnar branches. The tunica adventitia was injected with novocain, and this coat, with its sympathetic nerve fibres, was stripped for three inches above the constriction and just below it. No expansion of the artery or its distal branches occurred after the lapse of ten minutes. The wound was then closed.

Progress and Result.—In twelve hours the condition of the fingers had improved, and in eighteen hours pulsation had returned in the radial artery. In thirty-six hours full restoration of the circulation had taken place, as seen by a normal appearance of the fingers. Perfect function of the fingers, hand, and wrist had been restored, as well as full movements