Comments on Case II

This was a case of pulmonary suppuration probably resulting from atelectasis and infection. Alternatively it may have been metastatic, but if so one would not expect the predominant organism to be the pneumococcus. As there were neither clinical nor radiological signs of cavitation, pulmonary suppuration is a more descriptive diagnosis than lung abscess.

The result of postural treatment was very good, and, owing to this and the absence of cavitation, the question of surgical treatment fortunately did not arise.

By using the midline incision in war wounds the abdomen can be opened quickly, and, what is equally important, it can be closed quickly. It is comparatively bloodless, and can be extended upwards and downwards according to the needs of the case.

In colon injuries, perforated or bruised, exteriorization of the damaged loop as a colostomy is the safest procedure; when this is impossible the wound of the intestine should be sutured and a proximal double-barrelled colostomy of the Devone type performed. In cases of injury to the fixed parts of the colon a separate incision in the flank has many advantages.

The suction apparatus is invaluable in abdominal wounds as, in addition to its many other advantages, it reduces the number of swabs used to an absolute minimum, thereby contributing towards a fool-proof organization in the counting of swabs and packs.

It is interesting to record that the pilot officer, who escaped without a scratch, found 120 cannon-shell bases in the cockpit!

[Figs. 1 and 2 are reproduced from drawings by Leonard Squinell.]

A MODIFICATION OF THE INVAGINATION METHOD OF INTESTINAL ANASTOMOSIS

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In this communication a modified method of performing intestinal anastomosis is described which, it is hoped, will be of use in carrying out this operation quickly and efficiently. The operative technique was devised by me many years ago, and has only recently been employed on the living subject. In view of the measure of success achieved in the cases noted below, which were not ideally suitable for a trial application, I have been encouraged to bring the method to the notice of the profession, before having been able to practise it extensively, in the hope that surgeons in our field hospitals may find it useful.

During the last war Fraser and Dott used the invagination method with satisfactory results in abdominal emergency work in France necessitated through injuries caused by projectiles. They employed the method of temporary occlusion, and although the end-results of their operation and the one to be described are somewhat similar, there are important differences in: (i) the degree of invagination achieved at the site of anastomosis by means of a special instrument devised for this purpose; and (ii) the means of recanalization. Other "aseptic" methods have no doubt been adopted, both in this country and abroad, and any claim to originality on behalf of this method must depend upon the specific use of the two instruments undermentioned—viz., a screw and a pair of sharp-pointed angled forceps. It is hoped that these improvements will lead to the more widespread practice of this type of operation in suitable cases. It effects the union of two temporarily occluded ends of severed bowel and therefore leads to little soiling of the operative field. Preliminary technical investigations were carried out on fresh pig's bowel, and the union obtained was found to be sound and capable of withstanding high water pressure and considerable distension before any sign of leakage occurred round the site of anastomosis.

The special instruments required in addition to those normally available are: (a) an instrument of modified corkscrew pattern (Fig. 3); (b) a modified StClair Thomson angled

forceps; (c) a powerful broad-bladed enterotribe, of the Doyen pattern, and means of heating its blades (the means adopted was a small electric heater).

In describing this operation it is assumed that the part to be removed has been isolated, together with sufficient lengths of healthy bowel on both sides of the lesion to enable the union to be effected. From this point the technique employed is as follows:

Technique of Operation

The mesenteric attachments are ligated and divided close to the bowel. This operation is continued on each side of the diseased portion for a distance of one and a half to two inches. Two portions of healthy bowel, adjacent to the diseased part, are now crushed with the enterotribe. Sufficiently wide areas should be crushed to enable the next stage to be carried out. This consists in removing the lesion between ligatures. A "double overhand knot" (Fig. 1) should be used to occlude the healthy bowel-ends,

FIG. 1

as these ligatures have to be unloosed by mechanical means at a later stage in the operation. Silk is best for this purpose, as it is much less liable to slip than catgut. For temporary occlusion the pursestring, instead of the stump method, may be adopted so long as the same type of knot is employed. If a heated enterotribe is used for crushing the type of knot is immaterial, as an opening may easily be secured through the "roasted" bowel owing to its friability.

The occluded ends are now approximated, and before invagination are held together by half a dozen interrupted sutures round the circumference of the bowel (Fig. 2). The special "corkscrew" is

FIG. 2

then inserted into the lumen of the bowel with a screwing movement, in the approximate position as shown in Fig. 3, and partly screwed through the double diaphragm formed by the approximated occluded ends (Figs. 3 and 4).

FIG. 3

Invagination is produced by holding the distal part of the bowel in the left hand and pushing the diaphragm, by means of the

"corkscrew," into the distal portion (Fig. 4). This can be done easily when there is no great degree of disparity in the calibre of the two segments to be anastomosed, and to the extent of invaginating the mesenteric attachments. Invagination should be effected up to the mesenteric attachments at least. It should be noted that a greater degree of invagination is produced towards the antimesenteric

FIG. 4

than towards the mesenteric side of the bowel because the mesentery interferes somewhat with this process. In this way a good blood supply is ensured towards the antimesenteric aspect of the bowel and thus the risk of subsequent necrosis of that border is practically eliminated. A row of Lembert sutures, continuous or interrupted, is now inserted round the site of invagination, a mattress suture being used where the two mesenteric borders approximate.

The "corkscrew" can now be withdrawn and the StClair Thomson angled forceps inserted through the same opening, forcibly pushed through the double diaphragm (Fig. 5), and used in

FIG. 5

a scissors-like manner to obtain recanalization. As soon as this is accomplished the forceps are withdrawn with their blades closed, and the opening left after their removal is closed with a pursestring or other form of Lembert suture (Fig. 6). The operation is now

FIG. 6

essentially complete, and the abdomen is closed, with or without drainage as circumstances dictate. It will be appreciated that a considerable collar of invaginated bowel has been deprived of its blood supply, and this will slough off in the course of healing.

[NOTE.—In the case of the small intestine, where generally the upper segment of bowel is more distended than the lower and is much more friable, it will be easier, safer, and simpler to reverse the process of invagination so that the lower is pushed into the upper portion and, continuity having been restored, to invert the invaginated collar by massage—e.g., in cases of acute obstruction.]

Observations

Reference has been made to the fact that invagination methods have already been used in abdominal surgery. Maunsell's method was devised because it imitated the natural process of adhesive inflammation following sloughing. Although

used successfully on many occasions, it cannot be classed as an operation approaching the principles of aseptic technique. Simple end-to-end suture, and the various mechanical means of procuring circular enterorrhaphy, have the immediate disadvantage of not producing enough invagination of the bowel edges, with the subsequent risk of bowel necrosis towards the antimesenteric aspect. Ullman modified the operation, using a bobbin similar to that of Allingham.

The most successful mechanical means hitherto used for this purpose is Murphy's button. During the last war, as before mentioned, Fraser and Dott elaborated a method of securing end-to-end continuity of bowel by the device of temporary occlusion, without securing much invagination, no form of internal splint being used. The method above described may therefore claim to follow the principles of the Fraser and Dott operation and to achieve the greater degree of invagination secured by Maunsell.

Conclusions

This operation is submitted in the belief that it is: (a) comparatively aseptic if properly performed; (b) rapid and efficient in suitable cases; (c) a method providing free anastomosis with little risk of leakage or necrosis; (d) isoperistaltic in action and has, in the cases in which it has been adopted, resulted in natural bowel action and only slight post-operative distension and pain; (e) a suitable method of union in cases of excision of the caecum or part of the large bowel.

Although opportunity has not hitherto occurred of adopting this method in cases of injury to the small intestine or to gunshot wounds where the degree of injury necessitates excision, it would appear to be particularly suitable.

The following are condensed notes on three cases, all of which are concerned with operations upon the large bowel.

Notes on Three Cases

Case 1.—A woman aged 49. Referred by Dr. Milligan, suffering from carcinoma of the caecum. Very thin and anaemic. Large palpable mass in right iliac fossa. Operation Jan. 14, 1942. A hemicolectomy was performed, and junction of ileum to transverse colon effected by above method. For five days post-operative progress was good and the bowels opened naturally on the third day. On the second day there were signs of inflammation at the site of saline injection. She died from septicaemia on Jan. 24. The post-mortem report stated that the abdominal cavity was clean and the junction was good and patent, with no sign of leakage. There were septic infarcts in the lungs, and abscesses were present in the abdominal wound and behind the posterior peritoneal suture line. The site of the primary septic focus was undetermined, but it was gratifying to find the abdomen clean.

Case 2.—A woman aged 36. Referred by Dr. Shields. Acute intestinal obstruction due to carcinoma of transverse colon. A transverse colostomy was performed by the R.S.O. (Mr. Adlington). This successfully relieved the obstruction. Later (May 7, 1941), as the patient was unhappy about her colostomy, I performed the operation described, through a vertical incision outside the left rectus. Having excised the growth, temporary occlusion and approximation of the two ends of bowel were effected through this opening. Invagination and recanalization were carried out through the old colostomy opening. As a safety measure the colostomy was left open and a T-shaped drainage tube temporarily inserted to ensure the patency of the anastomosis and relieve flatulence. After the return of normal bowel movement the tube was removed and the opening closed by operation. She was discharged completely healed and with normal bowel movements.

Case 3.—A man aged 43. Referred by Dr. Milligan with tentative diagnosis of Crohn's disease. Operation Sept. 9, 1942. Resection of caecum and ascending colon performed. Anastomosis was effected as above. Growth proved to be an adenocarcinoma of caecum. Subsequent progress was very satisfactory. Natural bowel movements returned and flatus was freely passed on the fourth day without aperients. Radiological report by Dr. Miller on barium meal administered on Oct. 2: "Barium passed rapidly through intestinal tract. After four hours no barium in small bowel. After 24 hours all meal was evacuated." The patient was discharged on Oct. 28 with normal bowel action, and is now (May, 1944) quite fit and well. He has carried on his work on the railway for the past year.

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