RESECTION OF THE SMALL INTESTINE FOR WAR WOUNDS.

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The cases which form the basis of this paper were operated on during three years' service as surgical specialist to a casualty clearing station in France. Unfortunately, complete records for the whole period are not available, as with the exception of a few notes carried in a pocket book and dealing with a group of cases operated on during the Battle of the Somme in 1916, all other personal records were lost during the retreat on the Aisne front in May, 1918. The unit to which I was attached was serving on that front when the final German offensive towards Paris took place, and owing to a misconception as to the line of the enemy break-through, certain hospital equipment and all personal kit was sent back to a rallying point which rapidly fell into German hands. In the last phase of the war—the victorious advance—times were so strenuous and the forward moves so rapid, coupled with a certain short-handedness and a very definite war weariness, that the keeping of personal records fell into abeyance. Hence for this period and the previous eighteen months reliance must be placed on the palimpsests of memory, still very vivid, but statistically unreliable.

However, a brief table dealing with thirty cases operated on in 1916 remains, along with certain other notes, and will form a text for the following remarks, but it will be understood that the conclusions drawn are based not only on these cases, but on many other resections performed during the later periods of the war.

SELECTION OF CASES FOR RESECTION.

Whilst in general the principle of avoiding intestinal resection when simple suture of gunshot lesions is possible, is unassailable, it is clear that most cases demanding resection would fall into a more severe category than those in which simple suture was the obvious remedy, and consequently a heavier mortality would be expected, and consequently also statistics as to relative mortalities would be fallacious and of little value as backing a particular line of treatment. Furthermore, the personal bias and judgment of the individual surgeon enters into the question, and while one operator would regard a piece of damaged gut as capable of repair by suture, another would unhesitatingly perform resection. My own bias was strongly towards removal of a piece of gut which had been badly lacerated as being a rapid and effective method of setting a wounded man
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on the way to recovery, and wider experience during the later stages of the war went to confirm this attitude.

However, certain general indications for resection may be set forth:

(1) Complete division of the gut, in one or several places, as frequently resulted from machine-gun or rifle bullet wounds.

(2) Multiple wounds riddling a section of bowel and especially when the lesions affected the mesenteric border.

(3) Damage to the mesentery of such extent as likely to endanger the vitality of the associated gut.

(4) Obvious gangrene of a damaged area—a rare occurrence.

(5) Severe multiple holing involving possibly a considerable length of gut, necessitating much time spent in repair and likely to leave the restored part much lowered in vitality and unlikely to resume its functions. This is the class of case in which difference of opinion as to the best line of treatment was most likely to occur.

The strongest argument against resection undoubtedly is the amount of shock produced, and every care must be taken to guard against it by maintaining body warmth, by the use of large incisions to reduce manipulation and evisceration to a minimum, and by speedy, yet thorough, operating.

TECHNIQUE OF RESECTION.

Unless the site of the wound indicated a special line of approach the abdomen was opened by a large median or paramedian incision. The whole small intestine was rapidly passed in review, commencing usually at the ileocaecal junction, or the duodeno-jejunal flexure if the wound lay in the upper abdomen, the damaged area isolated by swabs and towels and a rough estimate made of the length requiring resection. (In the attached condition of the bowel this is difficult and the invariable tendency is to under-estimate.)

The gut above and below the resection was then emptied of its contents through convenient perforations by gentle digital "stripping." This was of great importance as regards the upper segment, especially in late cases in which the upper reaches of the jejunum were distended with much-bilious fluid, and time spent in careful and gentle emptying of the gut above the resection was time well spent, and greatly aided a smooth recovery.

Light intestinal clamps were then applied about one inch proximal and distal to the proposed line of section, the mesentery clipped with long-bladed artery forceps and divided piece by piece along a line near the gut, and the damaged portion cut away. The section of the intestine was made obliquely to prevent narrowing, and no excision of mucosa was practised except occasionally in the upper jejunum where it may be very redundant and hinder rapid suturing. After ligaturing the mesentery the clamps were laid side by side with the gut lumina looking upwards and
lying together like the muzzle of a double-barrelled gun, and an end-to-end junction was made by two layers of continuous silk sutures. My practice was to begin at the mesenteric borders and to adjust these accurately as the first step, but I am quite sure that the traditional danger of leakage at this site is greatly over-rated and must depend on very crude suturing if the line of section lies through healthy gut. The through-and-through suture was then carried across to the free border and returned to the starting point at the mesenteric edge by the Mayo-Connell method. The clamps were then removed and a continuous Lembert suture inserted, thus completing the junction.

The use of the Connell suture in the first layer gave such excellent peritoneal apposition that one was often tempted to be content with the single layer, but as life hangs so literally on a thread in these cases and the insertion of a second layer takes so little time, the single layer method was used only in those cases in which time was of cardinal importance. I occasionally employed it in later stages of the war, but think it is a good plan to make a few light scratches with a needle across the suture line so that a little lymph is poured out which tends to glue the ends together more firmly. Probably, however, additional sutures employed after accurate peritoneal apposition has been attained fall into the category of Sir Berkeley Moyr-Moylan’s “hypnotic” suture, hypnotic as regards the surgeon. Unfortunately, abundant opportunity was provided for post-mortem inspection of suture lines, and the rapidity and solidity of the union was most striking.

Another method of performing end-to-end union I learned from Major Gordon Taylor, O.B.E., R.A.M.C., and found very satisfactory. In this method heavy Ochsner artery forceps were applied to the gut so as to crush it, and the part to be removed was cut away flush with the forceps. These were then laid side by side and a posterior Lembert suture readily inserted by rotating the forceps slightly apart. The forceps were then removed and the crushed ends of the gut opened up to display the lumina, a through-and-through circular, and finally an anterior serous suture applied. The method is convenient and has the advantages of obviating any bleeding from the cut ends during the anastomosis, and of preventing eversion of the mucous membrane.

Lateral anastomosis was occasionally employed for certain reasons to be detailed later. It gave very satisfactory results and called for the simplest technique. After emptying the bowel as before described it was crushed with a heavy pair of Ochsner artery forceps above and below the part to be removed, a catgut ligature tied in the groove made, the damaged part cut away just beyond the ligature and the stump buried with a single purse-string suture. A long lateral anastomosis was then made as near the blind ends as possible, using light holding clamps and a double layer of sutures. Done in this way it takes very little longer than end-to-end anastomosis and presents certain advantages which are discussed later.
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Treatment of the Mesentery.

This was clamped off and divided parallel with the bowel about two inches from it, and tied off tightly in large pieces. Rapid division was greatly aided by the use of long-bladed forceps. After ligature so much puckering resulted that only a very small gap in the mesentery remained to be closed even after extensive resections, and this was readily done with a few interrupted sutures.

It is a useful refinement in technique to divide the bowel so that the line of section lies opposite one of the final vascular loops made by the branches of the superior mesenteric artery as they pass to the wall of the intestine. The ultimate vessels enclose between them roughly quadrilateral sections of mesentery which are almost avascular, and in the jejunum and upper ileum are of considerable extent. The mesentery can be split vertically in these spaces right down to the connecting loop without any bleeding, and from this point the mesentery is divided parallel with the bowel until the opposite limit of the resection is reached. The gap is finally closed at right angles to the bowel by a few points of suture burying the ligatured stumps of mesentery. This leaves a supple mesentery opposite the suture line and provides a better peritoneal covering for the mesenteric border.

Treatment of the Peritoneal Cavity.

Lavage.—In the earlier stages of my experience in dealing with abdominal wounds, the amount of soiling of the peritoneum by infected blood and extravasated intestinal contents seemed so overwhelming as to demand the most energetic methods of cleansing. Consequently a very copious lavage from douche can and tube was carried out with saline, occasionally varied with eusol. After a time this practice was given up and simple mopping out of the peritoneum substituted, combined occasionally with local flushing if an area such as the pelvis appeared to be specially soiled, and after experience of both procedure the latter became the method of choice as being simpler and at least equally effective.

The cleansing of the hypochondria and the lesser sac especially provided difficulties, but, curiously enough, subphrenic abscess occurred very rarely, though suitable conditions for its making must often have been left after the most careful cleansing.

Drainage.—At first it was my almost invariable practice to drain the pelvis by means of a large split rubber tube with a light gauze wick and to aspirate frequently, but the small amount of drainage which took place through such a tube and the frequency with which post-mortem examination revealed the tube so surrounded by coils of gut as to serve no useful purpose, soon showed that such a drain was both unnecessary and futile. It was therefore given up and beyond placing a drain down to a local septic focus, or to the vicinity of a dubious suture line in the colon, reliance was placed on careful cleansing of the abdominal cavity and complete closure of the laparotomy wound without drainage.
The above remarks on drainage apply only to the cases under present consideration and not to certain aspects of abdominal surgery in civil practice.

The ability of the peritoneum to deal with severe sepsis, as seen in these war wounds when soiling of the most gross character often occurred, was certainly most impressive.

**Abdominal Closure.**—The abdominal wound was almost always sutured in two or three layers—partly because it was practically as speedy as the through-and-through method, and partly because there was a certain comfort in having the peritoneum completely closed off, in view of the marked tendency of these wounds to suppurate.

**After-Treatment.**

(1) **Purgatives.**—While certain cases of resection had a convalescence as smooth as that of a simple appendix and called for as little after-treatment, the majority had a stormy time for the first few days and especially the first forty-eight hours. During this period no good was done by adding to the patient's distress by giving purgatives, though at first from over-anxiety to obtain tangible evidence of peristaltic activity one fell into the error of attempting to bustle the bowels. Inflamed and traumatized bowel, like an inflamed knee-joint, calls for rest, and it is illogical to harry such bowel by early and vigorous purgatives.

Provided the general condition kept satisfactory and especially if the pulse were steadily improving and the abdomen softening, there was no cause for anxiety on this account, and indeed some cases had a natural action of the bowels on the fourth or fifth day. If distension appeared and was sufficient to cause distress, a turpentine enema was given, and repeated if necessary, and followed on the fourth or fifth day by castor oil, aided sometimes by pituitrin given intramuscularly. Of the drugs, given specially to promote intestinal peristalsis, intramuscular pituitrin in one cubic centimetre doses was the most efficacious, and given alone or associated with a glycerine and magnesium sulphate enema in obstinate cases sometimes acted like a charm and with startling rapidity to the uninitiated nursing staff!

(2) **Vomiting** was often troublesome during the first thirty-six to forty-eight hours and called for gastric lavage, often with dramatic benefit. Judging by the amount of the vomit, and from the parallel of the frequently marked dilatation of the duodenum and upper jejunum seen at late operations and post mortem, some degree of gastric dilatation must often have been present, demanding prompt treatment.

(3) **Rectal saline** by interrupted doses or the drip method was given as a routine, but during heavy battle periods when the stress of work in the wards was very great, it was sometimes perforce omitted, and I do not think cases came to any great harm for lack of it.

(4) **Posture.**—The same remark applies to the semi-sitting position and
many patients were allowed to suit themselves as to the position of greatest comfort.

(5) Morphia.—This provided an interesting problem and one had abundant experience of it given both before and after operation. Abdominal cases often arrived at the casualty clearing station having been heavily morphinized—and properly so—in their passage along the via dolorosa from the battle front. At first one was inclined to attribute the distension often seen at operation in both small and large intestine partly to the effects of morphia, but on further consideration one became convinced that generous morphinization did much more good than harm, and undoubtedly morphia and warmth were the greatest preventives against shock.

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Length resected</th>
<th>Anastomosis</th>
<th>Complications</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8 in.</td>
<td>End to end</td>
<td></td>
<td>Recovered</td>
</tr>
<tr>
<td>2</td>
<td>6 in.</td>
<td>&quot;</td>
<td>Three small holes in bladder and one in rectum sutured</td>
<td>&quot;</td>
</tr>
<tr>
<td>3</td>
<td>5 ft.</td>
<td>&quot;</td>
<td></td>
<td>Died</td>
</tr>
<tr>
<td>4</td>
<td>2 ft.</td>
<td>Lateral</td>
<td></td>
<td>Recovered</td>
</tr>
<tr>
<td>5</td>
<td>3 ft. 9 in.</td>
<td>Lateral</td>
<td>Pancreas lacerated. Extensive fat necrosis</td>
<td>Died</td>
</tr>
<tr>
<td>6</td>
<td>8 in.</td>
<td>End to end</td>
<td></td>
<td>Recovered</td>
</tr>
<tr>
<td>7</td>
<td>14 ft.</td>
<td>&quot;</td>
<td>Mesentery lacerated; great hemorrhage</td>
<td>Died</td>
</tr>
<tr>
<td>8</td>
<td>6 in.</td>
<td>Lateral</td>
<td>Hole in bladder and rectum sutured</td>
<td>Recovered</td>
</tr>
<tr>
<td>9</td>
<td>14 ft.</td>
<td>Lateral</td>
<td>Forty-five hours old</td>
<td>Died</td>
</tr>
<tr>
<td>10</td>
<td>5 ft. 3 in.</td>
<td>&quot;</td>
<td></td>
<td>Recovered</td>
</tr>
<tr>
<td>11</td>
<td>5 ft.</td>
<td>&quot;</td>
<td>Missle entered popliteal space and lodged in left lung</td>
<td>Died</td>
</tr>
<tr>
<td>12</td>
<td>6 in. Double</td>
<td>End to end</td>
<td>Several other holes sutured</td>
<td>Recovered</td>
</tr>
<tr>
<td>13</td>
<td>6 in.</td>
<td>&quot;</td>
<td>Hole in bladder and rectum sutured</td>
<td>Recovered</td>
</tr>
<tr>
<td>14</td>
<td>14 ft.</td>
<td>&quot;</td>
<td></td>
<td>Died</td>
</tr>
<tr>
<td>15</td>
<td>2 ft.</td>
<td>&quot;</td>
<td></td>
<td>Recovered</td>
</tr>
<tr>
<td>16</td>
<td>3 ft.</td>
<td>&quot;</td>
<td>Sigmoid divided. Colotomy</td>
<td>Died</td>
</tr>
<tr>
<td>17</td>
<td>2 ft.</td>
<td>Lateral</td>
<td>Hole in bladder sutured. (Chiefly extra-peritoneal)</td>
<td>Recovered</td>
</tr>
<tr>
<td>18</td>
<td>2 ft.</td>
<td>Lateral</td>
<td>Descending colon badly torn. Colotomy</td>
<td>Died</td>
</tr>
<tr>
<td>19</td>
<td>3 ft. 9 in.</td>
<td>End to end</td>
<td>Iliac colon divided. Colotomy</td>
<td>&quot;</td>
</tr>
<tr>
<td>20</td>
<td>3 ft. 3 in.</td>
<td>Lateral</td>
<td>Hole in bladder sutured</td>
<td>&quot;</td>
</tr>
<tr>
<td>21</td>
<td>5 ft.</td>
<td>End to end</td>
<td>Hole in rectum sutured. Sigmoid half divided. Colotomy</td>
<td>&quot;</td>
</tr>
<tr>
<td>22</td>
<td>5 ft.</td>
<td>&quot;</td>
<td>Complete trans. division of base of bladder. Gas gangrène abdominal wall</td>
<td>&quot;</td>
</tr>
<tr>
<td>23</td>
<td>7 ft.</td>
<td>Lateral</td>
<td></td>
<td>Recovered</td>
</tr>
<tr>
<td>24</td>
<td>3 ft.</td>
<td>End to end</td>
<td>Two holes in cecum sutured. Sigmoid almost divided. Colotomy</td>
<td>Recovered</td>
</tr>
<tr>
<td>25</td>
<td>2 ft.</td>
<td>&quot;</td>
<td>Large hole in descending colon sutured</td>
<td>&quot;</td>
</tr>
<tr>
<td>26</td>
<td>2 ft.</td>
<td>&quot;</td>
<td>Two holes in transverse colon sutured</td>
<td>Died</td>
</tr>
<tr>
<td>27</td>
<td>14 ft.</td>
<td>&quot;</td>
<td>Large hole in cecum and four in jejunum sutured. Twenty-eight hours old</td>
<td>Recovered</td>
</tr>
<tr>
<td>28</td>
<td>1 ft.</td>
<td>&quot;</td>
<td>Several other holes in jejunum and mesentery sutured. Eighteen hours old</td>
<td>Died</td>
</tr>
<tr>
<td>29</td>
<td>2 ft.</td>
<td>&quot;</td>
<td>Hernia of sigmoid and several feet of lacerated small gut. Twenty hours old</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

At first I was very chary about giving morphia to any extent after operation, but gradually, and especially after the advent of Professor Crile.
to back his theories in person, came to give it more and more and to have faith in its virtues, especially in cases doing badly. Though not pushing it to the extent of reducing respirations to an extreme level, given in sufficient amount to induce a restful state and to procure adequate sleep and coupled with its allies, gastric lavage and the rectal drip, it was undoubtedly of value in cases tending to go the wrong way.

(6) Blood Transfusion.—As might be expected many of the cases of gunshot wounds of the small intestine necessitating resection were suffering from the effects of severe hæmorrhage. Blood transfusion is mentioned in order to give it an unqualified measure of praise and to regret that its popularization on the British front was so long delayed. Thanks are largely due to our American allies in this connexion. In my unit I had an extensive experience of the merits of the citrate and bottle method of transfusion of Captain Oswald Robertson, U.S.M.C., at first under his personal tuition and afterwards with Captain G. R. Purce, M.C., R.A.M.C., and came to regard it as a most powerful life-saving measure in those cases in which hæmorrhage was the chief factor in bringing the wounded man to death's door.

It was occasionally used to bring severely bloodless cases into a fit state to stand operation, and then followed up by immediate laparotomy, but for choice was reserved until operation had been performed and the patient set on the high road to recovery so far as surgical handicraft went. Given then in amounts of 500 to 1,000 cubic centimetres depending on the apparent needs of the individual case, controlled by blood-pressure readings and repeated if necessary, it was of the very greatest value in dealing with desperate cases of hæmorrhage, and in less severe cases gave a great fillip towards recovery.

ANALYSIS OF CASES.

These may be considered under the following heads:—

(1) Time interval between receipt of wound and operation.
(2) Length of gut resected.
(3) Choice of method of anastomosis.
(4) The influence of complications on recovery rate.

(1) Time Interval between Receipt of Wound and Operation.—This averaged ten hours, the shortest being one and a half hours (a bomb accident not far from the casualty clearing station), and the longest forty-five hours. The latter and several other very late cases are excluded in taking the average as giving the series an unduly long interval. While, of course, in view of the frequency of severe hæmorrhage and spreading peritonitis, it was all to the patient’s advantage to be operated on as speedily as possible after being hit, and twenty-four hours formed a good rough-working limit for primary operations, yet certain cases operated on during the second twelve hours did as well as those during the first twelve hours. These favourable late cases were those in which the hæmorrhage factor
was slight, and the intestinal shock so marked that the injured gut lay immobile, and extravasation of intestinal contents did not take place, even in the presence of large perforations.

Thus the onset of peritonitis of severe degree was sometimes late, but, on the other hand, quite extensive peritonitis was occasionally present after a very few hours. I personally came to regard cases which had gone longer than about twenty hours as having lost the tide as regards favourable primary operation, but many exceptions occurred and no fixed rule was possible. Blood pressure and body warmth were the best guides to the wounded man's chances, and if these failed to respond rapidly to resuscitation treatment, a fatal result was almost invariably to be expected.

(2) Length of Gut resected.—This varied from 6 inches to 7½ feet, the average of this series being 2½ feet. The longest successful resection was 6½ feet (Case 5), and another of 7½ feet promised well, but was killed by gas gangrene of the abdominal wall (Case 23). The length of gut resected was in itself a minor factor, within reasonable limits, in determining a successful result or otherwise, as so many other factors came into play. The amount of additional, shock produced in performing a large resection (say over three feet) as compared with that induced in a small resection was very slight, though, of course, more time was consumed in dealing with the additional length of mesentery and a definite amount more operative trauma inflicted. Nevertheless, it was a striking fact that cases requiring extensive resections suffered little more shock from the operation per se than those in which only a short length of gut was involved.

It will be noted that in the above series only one case of double resection appears a man in whom the missile traversed the abdomen in a vertical direction from a wound of entry in the popliteal space to end in the chest and lacerated two widely separated coils of gut (Case 12). This has a bearing on the foregoing remarks regarding the length of a resection, for it was obviously better and speedier to include two badly lacerated portions of gut separated by a fairly sound portion of moderate length in a single resection rather than to make two, and possibly include some patchwork between them. The patient with the single resection was left with a single line of trauma at the junction and sound bowel above and below, instead of two separated by a short length which had, perhaps, undergone repair in several places. Of course certain cases occurred in which two widely separated segments of bowel suffered severe damage and required separate resections as in the case above detailed, but in my experience these were rare.

(3) Choice of Method of Anastomosis.—While in general one may say that in the case of the small intestine end-to-end union is the method of choice for restoring continuity, yet lateral anastomosis seemed preferable under certain circumstances. The table of cases shows that it was employed several times, and in subsequent periods it was used with about equal frequency, and further experience confirmed the belief that it may
occasionally be the more suitable method. The indications may be briefly stated:-

(i) Cases in which an extensive resection was required and left two grossly unequal ends of bowel. The distal end could, of course, be enlarged up to a point by oblique section and longitudinal splitting of the free border; but even then difficulties might remain in making a neat junction. In fact, the resulting picture might resemble a stricture of the gut with a large baggy segment above and an attenuated one below, to such an extent that an obstruction seemed likely to follow.

(ii) Cases in which considerable peritonitis was present, and the upper reaches of the gut showed marked distension and seemed likely to become paralysed. In this group better drainage and a safer junction was provided by a big lateral anastomosis. In the parallel case of a soldier with intussusception of several days' duration, due to inversion of a Meckel's diverticulum, I resected the gangrenous intussusception and some sodden bowel on the proximal side, emptied the upper segment, and made a wide lateral junction with a most satisfactory result.

(iii) Cases of resection of considerable extent in the lower ileum. Here the bowel may be so thin and the lumen so small that end-to-end union may leave an extremely narrow channel and favour obstruction. Possibly this impression was more apparent than real, owing to the frequent presence of spasmodic contraction of parts of the intestine, but I lost one very favourable case from this cause, and think it better to make a lateral junction or to put the proximal end into the caecum.

(4) The Influence of Complications on Recovery Rate.—The general recovery rate in the quoted series is 46.6 per cent., but it must be emphasized that these cases were operated on during the summer months, this being all in the wounded man's favour. In the cases in which the small intestine alone was involved it rises to seventy-five per cent. On the other hand, the super-imposing of damage to the pelvic viscera will be seen to be specially severe. In this connexion it was interesting from the anatomical standpoint to observe how much small intestine could be injured by a missile traversing the pelvis alone. On one occasion (Case 23) I saw seven feet of gut absolutely riddled by such a wound, and soon came to regard these pelvic wounds as specially grave owing to the large amount of intestine nearly always involved, to the associated damage to bladder or rectum or both; and to the particularly severe type of peritonitis set up.

Associated damage to the colon above, which could be dealt with by suture or colotomy, was much less severe, and some of these combined cases did very well.

Conclusions.

(1) The mortality rate of gunshot wounds of the small intestine submitted to operation and requiring resection will be round about fifty per cent, usually more than less. In uncomplicated cases it may fall under very
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favourable circumstances to 25 per cent, while in complicated cases and especially those associated with damage to the pelvis and pelvic viscera it may rise to 75 or even 80 per cent. The mortality will be considerably greater in winter owing to the lethal effects of wet and exposure to cold and to the greater incidence of chest complications after operation. I personally would regard a recovery rate of one in three as very satisfactory under all seasonal conditions. The influence of distance of the casualty clearing station from the firing line may be stated paradoxically as follows: the nearer the operating station to the firing line, the greater the operative mortality, but more cases will arrive fit for operation and more will be saved.

(2) The selection of cases for resection depends to some extent on the bias and judgment of the individual operator.

(3) The precise length of gut resected up to a limit of roughly one-fourth of the total length of the small intestine is not of major importance.

(4) End-to-end union is the method of choice, but under certain circumstances lateral anastomosis may be preferable.

(5) Emptying the upper segment of bowel, especially when distension has already set in, is of the greatest value, and illustrates a cardinal principle in abdominal surgery. This, and the occasional choice of lateral anastomosis, both aim at the avoidance of distension and paralysis of the upper segment.

(6) Haemorrhage is the most potent factor in causing a heavy primary mortality and blood transfusion is of the greatest value in saving desperate cases brought to death's door by profound bleeding. This life-saving measure should prove of equal value in abdominal emergencies associated with grave haemorrhage in civil practice.

As this paper is simply a record of personal experience and impressions, no references are made to the work of the many other surgeons of the casualty clearing station zone, but in considering the relation of mesenteric damage to the necessity for resection, and the choice of the method of resection in relation to avoiding distension and paralysis of the upper segment of bowel, the experimental work of Fraser and Drummond, carried out on active service, must be taken into account.

To the Consulting Surgeons of the IVth Army, during the Battle of the Somme, Major-General Sir Anthony A. Bowly, K.C.B., etc., and Colonel Thomas Sinclair, C.B., my special thanks are due for much help and encouragement during a very strenuous period. To my anaesthetist, H. P. Crampton, M.D., late temporary Captain, Royal Army Medical Corps, Anaesthetist to Middlesex Hospital, I bear a special debt of gratitude.
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