

MESENTERIC INJURIES AND INTESTINAL VIABILITY

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IN PENETRATING wounds of the abdomen, injury to the mesentery is one of the most common and serious lesions encountered. Hæmorrhage itself may be fatal from injured mesenteric vessels; slits in the mesentery lead to hernia; but aside from this what especially should be emphasized is that mesenteric injuries are of importance in proportion to the extent to which the integrity of the blood supply to a given intestinal loop is compromised. So that a mesenteric injury cannot be considered as a clinical entity but as an intestinal injury as well.

In addition to injuries resulting from trauma of the mesentery, we have also to consider the surgical removal of cysts and tumors of the mesentery, as their removal may affect the viability of an intestinal loop. Therefore in dealing surgically with traumatic injuries and new growths of the mesentery, it is necessary to arrive at a rather definite conclusion as to how much of the blood supply can be sacrificed and yet leave the affected loop viable. Failure to resect a loop of intestine incapable of regaining its vitality would be disastrous, while doing unnecessarily a resection would also give a tremendous increase in mortality, especially in traumatic injuries, as other organs are frequently injured at the same time, making such a case a very poor surgical risk. So that in a border-line case severely shocked it would probably be better not to do a resection.

Warbasse¹ says wounds parallel to the bowel, if they cross one or two large vessels, require resection of the bowel, and that simple suture of wounds of the mesentery is not much called for because wounds large enough to require suturing are apt to have done so much damage to the vessels as to demand more radical treatment.

Da Costa² says if branches of the superior mesenteric artery are divided near the bowel, gangrene of the bowel will result, but wounds of a branch far from the intestine do not cause gangrene. If the wound is found close to the gut, the portion of the gut supplied by the cut vessel should be resected.

Fowler³ says that if more than an inch or so of mesentery is torn from an intestine, a resection should be done.

Surgical teaching would seem to fix a mesenteric tear of about two inches at its intestinal attachment as being the border line; that is, greater lengths would require resection while shorter lengths would only require suturing.

The clinical cases herewith reported, supplemented by some experimental work that I have since done, would tend to show that a much more extensive sacrifice of the blood supply can be tolerated without the necessity of a resection.

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EXPERIMENTAL WORK

CASE I.—White man, age thirty-six, was shot in the abdomen with a thirty-eight-calibre pistol and was admitted to the hospital in a marked state of shock with severe abdominal pain and with general board-like rigidity. A laparotomy was done within three hours of the accident.

There was a large quantity of blood in the abdomen. Nine perforations were found, two in the transverse colon and seven in the small intestine. The perforations were closed in the usual way. The bullet ranged along the mesenteric attachment, severing the blood supply to an intestinal loop, for four inches. The bleeding vessels were ligated and the mesentery sutured to the intestine.

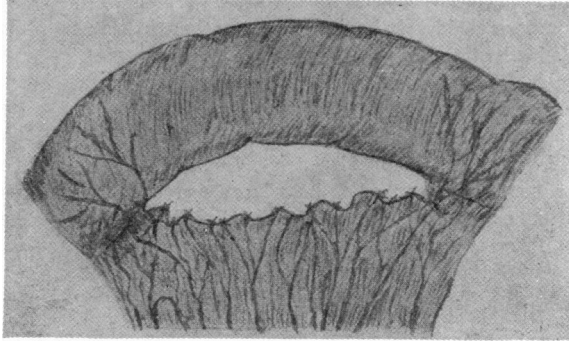


FIG. 1.—Drawing shows mesentery separated from intestinal loop with vessels tied off, illustrating condition in clinical cases dealt with; also as produced in experimental cases.

The omentum was then tucked around this intestinal loop and tacked. No resection was done. A drain was put in. Patient made a good recovery and is now in good health, five years after operation.

CASE II.—White man, age sixty-six, dairyman; was severely gored by a bull July 28, 1921. The abdomen was torn open and a number of coils of small intestine were dragged and forced out of the abdomen. The man was then wallowed about in the farmyard before he could be rescued. A large bath towel was pinned around him to support the extruded intestinal loops, and the patient was taken to St. Peter's Hospital, where I first saw him

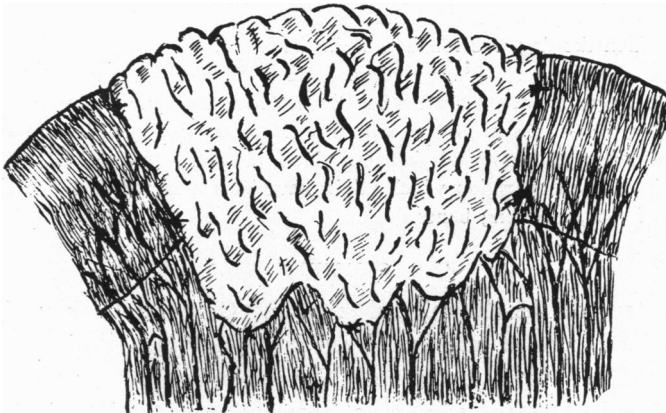


FIG. 2.—The mesentery has been sutured back to the intestine and the omentum tucked around the damaged loop and tacked in position as was done in the clinical and experimental cases.

several hours after the accident. He was in a marked state of shock, with coils of intestine still outside and there was hæmorrhage from the wound. Treatment to combat shock was immediately instituted, followed by operation. There was a large irregular wound three and one-half by five inches through the right rectus muscle about the level of the umbilicus. This wound was excised and enlarged, whereupon the abdomen was found to have a large quantity of free blood. Hæmorrhage was still in progress from torn mesenteric vessels. The horn had passed through the base of the mesentery and

ranged upward along the aorta, stripping off the peritoneum and loosening the head of the pancreas and duodenum. The mesentery was torn loose from the small intestine at its attachment at two different points, one for a distance of three inches and the other for eight inches. After ligating the bleeding vessels (Fig. 1) the mesentery was sutured to the intestine, and the omentum tucked around the long damaged loop and tacked in position. (Fig. 2.) Owing to the general condition of the patient a resection was not done. For several days following the operation the patient remained in a serious condition but gradually improved. There was slight drainage from the wound for about ten days. Aside from this the man made an uneventful recovery and left the hospital in about three weeks, and is now in good health, seven years after operation.

CASE III.—Woman, age thirty-eight, had tumor mass completely filling the pelvis, which could be palpated above pubes. This was at first thought to be an ovarian cyst. At operation it proved to be a large mesenteric blood cyst. It was attached close to the intestine and in its removal the blood supply to the intestinal loop was apparently sacrificed for three and one-half inches. The omentum was tacked around the loop and over the raw mesentery. Patient made a good recovery, and is now in good health three and one-half years after operation.

Dog No. 1.—Was operated on March 2, 1923. Six inches of mesentery was ligated and cut away from the intestine, severing all blood supply. (Fig. 1.) The mesentery was then sutured to the intestine to close the opening and omentum was tacked around the damaged loop. (Fig. 2.) The dog made a good recovery. Three months later the dog was again operated on to explore the result. It was found that omentum was densely adherent to the intestinal loop and exceedingly vascular.

Dog No. 2.—Was operated on March 5, 1923. Eight inches of mesentery was ligated and separated and treated as in dog No. 1. This dog made a good recovery and got away two weeks after operation.

Dog No. 3.—Was operated on March 12, 1923. I meant to separate the mesentery for about ten inches, but when the vessels were tied and the mesentery severed I found that thirteen inches had been separated. This dog at first vomited more than the others but apparently made a good recovery, and was able to take all kinds of food. Five weeks after the operation the dog was found dead in the morning without any signs of having been sick the day previous, having taken food well, and was as playful as usual. Unfortunately, I was out of town attending the state meeting and did not get to autopsy this dog. After five weeks of normal health it does not seem plausible to assume that this dog died from a failure of this intestinal loop to regain its vitality. This dog was pregnant at the time of operation which might have been a factor. All these dogs were fed all kinds of food, including bones.

COMMENT

At this stage of the clinical and experimental work I am unable to say where these long loops of intestine, freed from their mesenteric blood supply, got sufficient nourishment to survive. The mesenteric vessels near the intestine are said to be terminal and do not anastomose in the intestinal coats. It does not seem plausible that simple suturing of detached mesentery with its ligated vessels back to the intestine would establish blood supply sufficiently early to save the damaged loop. Therefore it would appear that wrapping the omentum around the intestine and suturing it in position (Fig. 1) hastens the formation of plastic adhesions about the loop, thus facilitating the reestablishment of the blood supply. On exploring one of the dogs two months after operation the omentum, mesentery, and the intestine itself were found to be

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very vascular at this area. Aside from the scientific and clinical interest, the important practical point is that a long loop so treated does survive, making a resection unnecessary. I am not prepared to say that it would always be safe to ignore a loop of intestine separated from its mesentery from eight to ten inches as the clinical and experimental work might tend to show. However, in border-line cases already severely shocked, I am of the opinion that it would be safer not to do a resection, certainly, where no more than four or five inches are separated, which is about twice the previously recognized border line. More conservative surgical treatment promises the better result.

If one would look over records of resections in different hospitals and work done by different operators it would be found that the results would be far from satisfactory. I am unable to say whether this is due to a faulty technic or to the pathology dealt with. Probably both are factors, but I should say the traumatic or pathologic condition for which a resection is usually done is often a very grave condition itself, and when the shock of a resection is superimposed the mortality will be much higher.

I recall that early in the war the mortality from intra-abdominal injuries was so high in the British Military Hospitals that a commission was sent out to investigate it. It was decided that too many resections were being done, and they sent out a bulletin urging that resections be avoided wherever possible and that simple closures of intestinal injuries be done instead, even though it caused considerable narrowing and angulation of the intestine. Following this the results were better and the mortality reduced. Therefore it is desirable, in dealing with mesenteric and intestinal injuries, to resect only in the presence of urgent indications.

CONCLUSIONS

1. This limited clinical and experimental work would tend to show that a much more extensive sacrifice of the blood supply to an intestinal loop can be tolerated than has heretofore been taught and practiced.

2. It necessarily follows that the number of intestinal resections can be materially reduced with a reduction of mortality, shortening of convalescence and increase in number of complete recoveries.

BIBLIOGRAPHY

¹ Warbasse: Surgical Operations, vol. xi, p. 568.

² Da Costa: Modern Surgery, p. 945, 1913 edition.

³ Johnson: Operative Therapeutics, vol. iv, p. 376.