REPAIR OF LACERATION OF SUPERIOR MESENTERIC ARTERY ACQUIRED BY NON-PENETRATING INJURY TO THE ABDOMEN*

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WORLD WAR II and the Korean War pointed to the need of attempts to restore injured arteries to normal function. A search of the literature has revealed an increasing frequency of repairs of major arteries, particularly in those of extremities, with improving success.

From the Korean War Ziperman[5] reported 224 cases of arterial injuries, with 132 treated by repair. Of these 132 repairs, only 26 (19.7 per cent) resulted in gangrene.

DeBakey and Simeone,[1] in their extensive review of 2,453 arterial injuries in World War II, found that in 1,639 arterial injuries treated by ligation 802 (48.9 per cent) resulted in amputation. In 144 injuries treated by repair, 64 (44.4 per cent) resulted in amputation.

However, this search has failed to record an instance of a repair of a lacerated superior mesenteric artery. The author, in reviewing his World War II battle casualties, personally operated upon at a field hospital in the European Theatre of Operations, found that in 109 cases of penetrating wounds of the abdomen there were no injuries to the superior mesenteric artery. In war injuries there surely occurred injuries to the superior mesenteric artery, but since the results of such an injury usually lead to a rapid death, the vast majority of such cases would not get to a hospital in time for definitive surgery. This, coupled with the timidity which many surgeons have towards dissection close to the superior mesenteric vessel, has not been conducive to surgical approach other than by extensive resection of the small bowel and colon.

Klass[5] has reviewed the literature on the surgical approach to disease of the superior mesenteric artery and quotes Ficarro,[2] who found that there were only 32 survivors in 554 cases of superior mesenteric occlusion by embolus, treated by resection. Klass then reports two cases of embolectomy of the superior mesenteric artery which survived 48 hours. At autopsy in one case it was found that the artery was patent with normal color of the bowel, and that death was due to myocardial failure. In the second case, death was due to massive intraperitoneal bleeding from failure to ligate the veins lacerated in the dissection adjacent to the superior mesenteric artery, but the superior mesenteric artery was patent and the color of the bowel normal.

Because of the hope raised in the above cases of Klass, the author wishes to present a successful repair of a laceration of the superior mesenteric artery in a non-penetrating injury to the abdomen.

CASE REPORT

The patient, a white male, aged 22, was admitted to The Hospital Center at Orange at 4:30 P. M., November 4, 1953, 30 minutes after he was injured. He stated that while standing erect he was caught between the tail gate of a truck, which was backing, and a loading platform. The patient was unable to tell exactly the point of greatest impact, but stated that his back and abdomen were painful. His past history revealed that he had an appendectomy in childhood, and that he had mild attacks of asthma, but that at the time of admission he was free of

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asthmatic symptoms. On admission the patient's blood pressure was 86/60. An infusion of 1,000 cc. 5 per cent D/W was started and blood taken for cross matching. Physical examination of the patient revealed a young man who was pale and somewhat

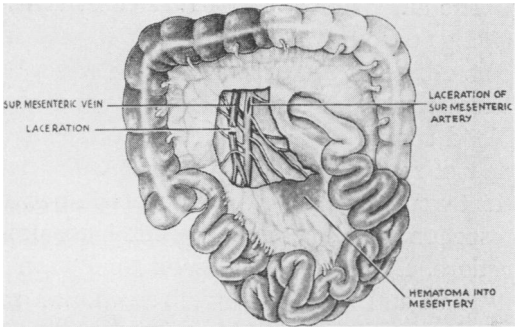

FIG. 1. Schematic drawing to show the laceration of the posterior peritoneum, laceration of the superior mesenteric vein, and the laceration in the superior mesenteric artery. It also shows the loss of blood supply in the small and large bowel affected by the ligature around the artery.

anxious. The mucosa of the mouth and conjunctiva was paler than normal. The chest was resonant to percussion and there were no râles. The heart sounds were rapid and soft, but otherwise normal.

The abdomen was scaphoid, with no apparent distention. There was a small area of contusion in the left upper quadrant about midway between the left costal margin and the level of the umbilicus. The abdomen along the left rectus muscle was quite rigid, with only moderate tenderness and minimal rebound tenderness. There was lesser rigidity on the right side. Percussion of the lower left thorax in the axillary line and the left upper quadrant gave no evidence of fluid. But percussion of the left flank revealed definite evidence of shifting dullness. Auscultation of the abdomen revealed no peristaltic sounds. The genitalia were normal. Rectal examination suggested fullness in the cul-de-sac. Gross palpation of the spine disclosed no abnormalities.

At 5:15 P. M. the blood pressure was 84/38; at 6:00 P. M. the blood pressure was 92/48.

Shortly after admission the blood count showed RBC, 4.5 million, with 12.4 Gm. Hgb; the WBC was 20, 950, with 89 per cent polymorphonuclear cells. Urinalysis disclosed specific gravity, 1.023; slight trace of albumin; negative sugar; slight trace acetone; occasional WBC, and occasional RBC.

Enroute from the emergency room to the floor a film of the lower thorax and abdomen was taken, which showed no pulmonary abnormalities or injury to the diaphragm. There was no free air under the diaphragm. There was nothing to indicate fluid in the peritoneal cavity.

When the patient had received 500 cc. of blood, his blood pressure came up to 122/80, with pulse of 96. His color was noticeably improved, although his abdominal findings were more pronounced and there was evidence of more fluid.

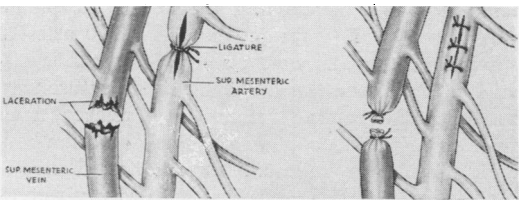

FIG. 2. Two drawings showing the enlarged vessels with ligature around the lacerated artery; appearance of artery and vein after repair of artery and ligature of vein.

The preoperative diagnosis lay between ruptured spleen or liver and/or torn mesentery. The patient was taken to the operating room after the second 500 cc. of blood was underway. He was given endotracheal anesthesia of cyclopropane, ether and oxygen.

On entering the abdomen through a left rectus muscle-splitting incision, a moderate quantity of free blood was found in the peritoneal cavity. The liver and spleen were both explored and found to be entirely normal. The origin of the bleeding was sought, and at this point the bleeding became extremely brisk, with no obvious localized area of bleeding. It was only by mopping out, first, the right upper quadrant, the right lower quadrant, and the left lower quadrant that it was determined the blood must be coming from the left upper quadrant. The transverse colon was brought out and retracted upwards. There was a large laceration in the posterior peritoneum about 3 cm. below the Ligament of Treitz, with the rent going laterally to the mesentery of the proximal jejunum. Clamps were used only on the edges of the torn peritoneum and the bleeding stopped by individual suture ligatures of cotton. It was noted during this interval that the severe bleeding was both venous and arterial. When the bleeding had been stopped (Fig. 1) we discovered that the small bowel, beginning 18 inches distal to the Ligament of Treitz and continuing to the cecum, was without blood supply and that the large bowel to the mid-transverse colon was without circulation. We felt that perhaps one of the suture ligations in stopping the hemorrhage had also ligated the superior mesenteric artery. Careful dissection in this area was carried out, and it was soon learned that the superior mesenteric vein was raggedly torn and widely separated, and had to be ligated. The superior mesenteric artery was dissected upwards. The encircling cotton su-

ture was found (Fig. 2). In pulling downward on the suture, blood spurted from the artery. It was then determined that, by fortuitous circumstances, the suture had encircled a longitudinal laceration of the superior mesenteric artery about 6 mm. in length. Further dissection was carried out so that holding sutures above and below the laceration could be placed. Three interrupted 00000 arterial silk sutures (Fig. 2) were placed to close the laceration of the artery, the encircling cotton suture was removed, the holding sutures were relaxed, and within a few seconds the small bowel and colon had their circulation restored, as manifested by a marked improvement in color and very vigorous peristalsis. A torn branch of the superior mesenteric artery had to be ligated. The defect in the mesentery of the jejunum was closed. About 15 minutes was used in this repair, and at the end of this time the bowel was found to have good circulation and there was no leak at the point of repair. The incision was closed in layers with cotton.

Because of the blood loss, 2,500 cc. of blood was used before, during and immediately after the operation. No heparin or dicoumerol was used either during or after operation.

The patient's convalescence was particularly uneventful. On the second postoperative day he was hungry, his abdomen was soft, and there was active peristalsis on auscultation. On the third postoperative day he passed gas, and in the fourth day he had three bowel movements. He left the hospital on the eighth postoperative day. Diarrhea persisted for several weeks, but slowly cleared up. Three months following his injury, the patient was free of symptoms and working at his usual occupation.

COMMENTS

In trying to determine the mechanics of the injury in a non-penetrating blow to the abdomen, one would have to say that the blow from either the tailgate of the truck or the loading platform struck the abdomen in such a way that the superior mesenteric vessels were impinged on the vertebral bodies. While the vein was badly mangled, fortunately the artery was lacerated so that massive bleeding did not occur until after the abdomen was opened and the laceration could be readily repaired.

The author must admit that he had misgivings concerning the time that elapsed in dissecting out the superior mesenteric vessels, because he could not be sure that the blood supply would be adequate after repair of so small an artery, and thus the patient would be subjected to a massive bowel resection after such a long preliminary procedure. However, the outlook from simple ligation and massive bowel resection is so bleak that the attempt to repair the artery was fully warranted.

SUMMARY

Because of failure to find a record of previous cases of a lacerated superior mesenteric artery, a case is presented with successful repair of that artery, to which the only alternative was resection of most of the small bowel and half of the large bowel.

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