

Open thrombectomy for acute superior mesenteric vein thrombosis secondary to iatrogenic vein injury. A case report and review of literature

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Keywords: Mesenteric vein thrombosis, open thrombectomy, bowel gangrene, management of mesenteric vein thrombosis, outcome of mesenteric vein thrombosis

Introduction

Iatrogenic mesenteric vein thrombosis (MVT), following SMV injury during intra-abdominal surgery resulting in acute intestinal ischaemia is rare (5- 15%). MVT results in venous gangrene of the bowel. MVT is associated with a very high mortality (1).

With early diagnosis and appropriate intervention, the bowel gangrene and the mortality can be reduced. The guidelines for optimal management for MVT are lacking due to the rarity of acute MVT following injuries to the Superior Mesenteric Vein (SMV) during surgery and delay in diagnosis of MVT. This case report describes a patient who developed superior mesenteric vein thrombosis following laparoscopic right hemi colectomy and injury to the SMV due to avulsion of the middle colic vein. She was managed successfully with open thrombectomy and SMV repair.

Case

A 59-year-old female underwent laparoscopic right hemi colectomy. During colonic mobilisation bleeding was encountered at the root of the mesentery due to avulsion of the middle colic vein. Procedure was converted to laparotomy and the haemostasis was achieved with difficulty by suture ligation. The colectomy was completed. An end-to-end distal ileum to transverse colon anastomosis was done. Towards the end of the surgery dusky discoloration of the distal end of the ileum was noted. However the small intestine was well perfused with visible pulsation of the terminal branches of the mesenteric artery at the intestinal border of the mesentery. Peristalsis was present. Therefore, no further action was taken and the abdomen was closed.

haemodynamically unstable with increasing need for inotropes and the serum lactate level was rising (serum lactate level was 7.9 mmol/l on arterial blood gas analysis- normal range 0.5 to 1.3). There was large amount of blood-stained drainage (1130 ml in the first 2 hours) from the abdominal drain. A decision was taken to perform an urgent relaparotomy suspecting a reactionary haemorrhage. At the relaparotomy, the whole length of the small intestine other than the initial few centimetres of the jejunum was found to be dark red in colour with absent peristalsis (Figure 01). On further exploration the mesenteric vein was found to be thrombosed at the site of middle colic vein injury.

Superior mesenteric vein (SMV) was mobilised proximally and distally. Proximal and distal control was achieved. A bolus dose of unfractionated heparin (100u/kg) was administered. The SMV wall was found to be lacerated due to avulsion of middle colic vein from its junction with the SMV (Figure 02). The haemostatic sutures applied during the initial surgery were found to be constricting the vein. The previously applied sutures were removed. Thrombectomy was done. The lacerated venous edges were trimmed. The defect was repaired with 6/0 polypropylene sutures transversely. The venous flow was re-established. Following thrombectomy and venous wall repair, the jejunum and the proximal ileum returned to normal colour (Figure 03). Peristalsis reappeared. The arterial pulsation was noticed in the terminal branches of the superior mesenteric artery. The colour of the distal ileum did not improve. Therefore the ileocolic anastomosis was disconnected and the distal end of the ileum was resected. The end of the ileum and the transverse colon were brought out as two separate stomas on either side of the midline incision. Following the surgery the lactate level returned to normal level gradually. The ileostomy started to function, the colour of the stoma was normal. At present the patient has been recovering slowly and being maintained with parenteral feeding. The patient was started on oral anticoagulation.


Discussion and conclusion

Mesenteric vein thrombosis resulting in bowel ischemia, occurring as a result of iatrogenic injury is rare and difficult to diagnose in the immediate postoperative period. However it is

About 6 hours after the surgery the patient became

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Received: 22-07-2022 Accepted: 29-07-2023

DOI: <http://doi.org/10.4038/sljs.v41i2.8980>



a very serious complication associated with a very high mortality in the past ranging from 12.5% to 50% (1) (2) (3) (4). However the mortality reported in recent series were lower ranging from 5% to 15% (5) (6).

The Superior Mesenteric vein (SMV) drains blood from the duodenum, jejunum and ileum. In addition it also drains blood from the caecum, the ascending colon and the right 2/3 of the transverse colon. In addition the large bowel and the duodenum have alternative venous drainage pathways through the inferior mesenteric and portal vein tributaries. The SMV joins the splenic vein posterior to the neck of the pancreas to form the portal vein, which eventually drains into the liver. MVT usually leads to distal jejunal and ileal

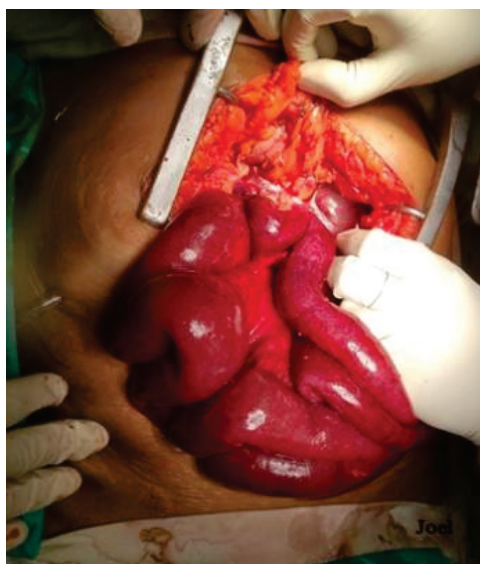


Figure 1. Image showing congested small bowel

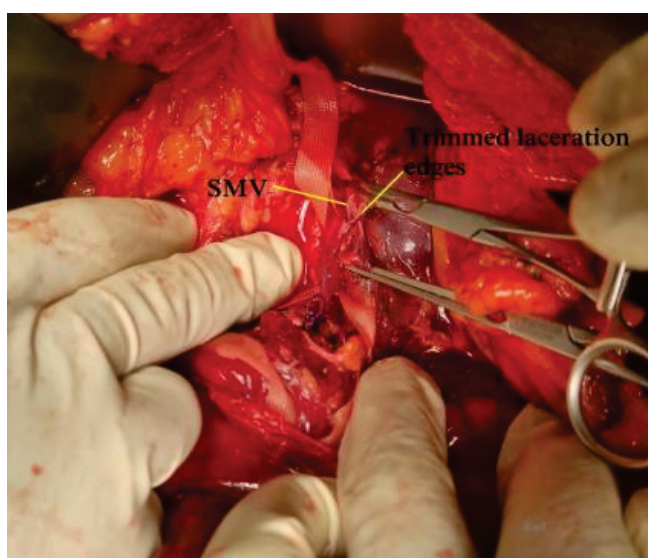


Figure 2. Image showing damaged wall of the superior mesenteric vein

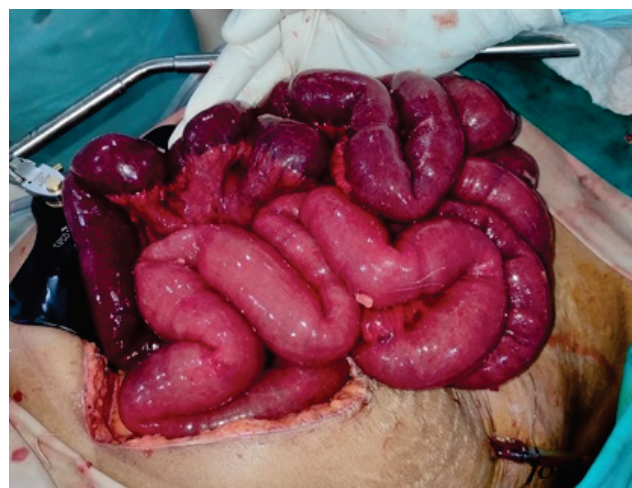


Figure 3. Image showing the recovery in congestion of the small bowel after thrombectomy

infarction and gangrene, perforation, sepsis and finally death. In addition the patient can develop short bowel syndrome as a result of extensive bowel resection. The large bowel and the duodenum are usually spared because of the alternative venous drainage.

Causes of mesenteric venous thrombosis following surgeries include, iatrogenic (due to venous wall injury, and accidental ligation of the vein as in the case above) and due to other postoperative factors. The commonest surgeries associated with MVT are, pancreatectomy and splenectomy. In addition the risk of MVT also increases with peritoneal inflammation and peritonitis occurring as a result of intra-abdominal surgeries.

Following accidental ligation of the vein as in the current case, the resulting stagnation to the flow leads to MVT. Stagnation also occurs following splenectomy.

Local factors like venous wall injury e.g. during pancreatectomy and splenectomy generally leads to proximal MVT, whereas other factors i.e. peritonitis, leads to small tributary vein thrombosis (7).

When mesenteric vein thrombosis occurs there will be stagnation and increased hydrostatic pressure at the venous end of the capillaries. This will lead to leakage of fluid through the capillary wall into the interstitial space of the bowel wall. This results in bowel wall edema. In addition due to increased venous end pressure at the capillaries, there will be reduced perfusion pressure to the bowel wall resulting in ischemia and necrosis leading to bowel wall gangrene.

Clinical features depend on the acuity of the onset and the

extent of the thrombosis. Abdominal pain is a common feature. However during the immediate postoperative period like in the patient described above, recognising the pain due to the MVT is difficult. The patient also develops increased blood stained fluid drainage due to bowel wall oedema and congestion as in this patient.

If the diagnosis is missed in the initial period, bowel gangrene results. There will be acidosis with a rise in the serum lactate level and leucocytosis (white cell count of more than 20000 /mm³) (8) (9). Eventually the patient develops bowel perforation, peritonitis and sepsis with multi organ failure. Finally the death results (7).

In postoperative MVT, as in the case described above, the patient also develops tachycardia. If there is a small intestinal stoma, the stoma effluent will be heavily blood stained. There will be a bluish discoloration of the stoma mucosa.

Imaging is used to confirm the diagnosis and to assess the extent of the thrombosis. Imaging is also used to assess the complications of the mesenteric vein thrombosis e.g. bowel gangrene. The main imaging modalities available are ultrasound scan (USS) and Computerised tomography (CT).

Ultrasound scan with Doppler will confirm the presence of thrombus. But USS is not suitable to assess the extent of the thrombosis. In addition USS will not adequately demonstrate the bowel complications. In addition during the postoperative period it is difficult to perform a USS.

Contrast enhanced CT angiography in portal venous phase (70s delay) is done to confirm the diagnosis. The CT scan has a sensitivity of 90%. If mesenteric vein thrombosis is suspected there CT scan should be done immediately (10). The CT appearances include filling defects in the lumen of the SMV, dilatation proximal to the occluded vein, bowel wall edema resulting in “halo sign” or “target sign”, oedema of the mesentery (mesenteric fat stranding) (11) and altered bowel wall enhancement (12). If there are any doubts about bowel wall gangrene, urgent laparoscopic assessment should be performed.

In all patients with acute MVT, intravenous heparin infusion should be started immediately, with a bolus dose of 100 IU per kg intravenously followed by 18U per kg per hour intravenous infusion. The activated partial thromboplastin time (APTT) is maintained at twice the normal range. Early anticoagulation is shown to improve the outcome and it also facilitates recanalisation of the vein. Studies have shown that early anticoagulation results in 61% to 80% recanalisation

rate in cases of acute MVT (13) (14). Subsequently the patients are converted to oral anticoagulants i.e. Warfarin. Warfarin is continued for 6 months if there are no further risk factors for recurrence as in the case described above (13). The international normalised ratio (INR) is maintained in between 2 to 3 while on warfarin.

The patients with bowel gangrene should be prepared for emergency laparotomy. At laparotomy the extent of the bowel gangrene and the presence of thrombosis in the mesenteric vein are confirmed. When abdominal exploration is done early as in the above described case, open thrombectomy should be attempted. Open thrombectomy is effective in removing large amount of thrombus. Only few series reported the outcome of open thrombectomy. In one series of mesenteric vein thrombosis, the mortality was less in patients who underwent thrombectomy and bowel resection than in patients who underwent bowel resection alone (15).

Endovascular options include catheter-directed administration of thrombolytic agents (e.g. tissue plasminogen activator (TPA) and Streptokinase) and mechanical thrombectomy. In catheter-directed administration of thrombolytic agents the thrombolytic agent is injected via a catheter either into the superior mesenteric artery (indirect lysis) or into the superior mesenteric vein (direct lysis).

To access the SMV, the catheter is inserted through the internal Jugular vein into the hepatic veins. Then it is directed through trans-hepatic route into the portal vein and subsequently into the SMV. Studies have shown good outcomes with direct thrombolysis. In one study done among 20 patients with superior mesenteric vein thrombosis, 15 (75%) had either complete or partial resolution of the thrombus. The major complications reported in this study were gastrointestinal haemorrhage and septic shock (16). Similarly in another study among 12 patients with superior mesenteric vein thrombosis, 7 (58.3%) had either complete or partial resolution of thrombus. This study also reported a 50% major haemorrhagic event (17).

Catheter-directed injection of thrombolytic agents into the artery (indirect lysis) is aimed at achieving the thrombolysis in the small venules. But it is less effective compared to direct injection into the vein. The reason being that the thrombolytic agent may pass through the collateral veins bypassing the thrombosed venules. This results in sub-optimal thrombolysis. Therefore a larger dose of thrombolytic agent and longer duration of infusion is needed to achieve thrombolysis (18).

Mechanical thrombectomy can be attempted in patients who have contra indications to the thrombolytic agents e.g. in the immediate postoperative period like the patient described above. The results for the above method is lacking.

Endovascular options are indicated in patients who remain symptomatic after 48 to 72 hours of anticoagulation, in patients with worsening abdominal signs and in patients who are not fit for surgical interventions. But in the patient described above endovascular options were not attempted due to non-availability and the patient's condition required and open surgery due to the presence of large volume of blood stained drainage.

Therefore in a patient with mesenteric vein thrombosis, if the patient is subjected to laparotomy i.e. for bowel resection, open thrombectomy should also be attempted as in the case described above. However the current tendency in local setting is to do only bowel resection and not attempting open thrombectomy. However the evidence suggests that performing thrombectomy at the time of surgery will reduce the length of bowel resection. In addition venous thrombectomy will also result in better patient out-come (15).

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Learning Points:

- Acute mesenteric vein thrombosis(MVT) is difficult to diagnose in the immediate postoperative period. Therefore high degree of suspicion is required.
- During exploration for acute MVT if confirmed, open thrombectomy should be done to reduce the length of bowel gangrene.
- Following resection for bowel gangrene caused by acute MVT, primary bowel anastomosis is avoided, and a relook laparotomy is advised