Clinical Case Report

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Acute superior mesenteric vein thrombosis associated with abdominal trauma

A rare case report and literature review

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Abstract

Rationale: Acute mesenteric vein thrombosis (MVT) is defined as new-onset thrombosis of the mesenteric vein without evidence of collateralization, finally resulting in extensive intestinal infarction. MVT may be idiopathic or be caused by conditions responsible for thrombophilia and acquired risk factors. To date, there have been few reports of MVT after trauma. Herein we describe our experiences treating three patients with MVT.

Patient concerns: Case 1 was a 44-year-old man with transverse colon mesenteric hematoma after blunt abdominal trauma. Case 2 was a 55-year-old man with jejunal transection after a traffic accident. Case 3 was a 26-year-old man presented with multiple abdominal stab bowel injury.

Diagnoses: A 1-week follow-up abdominal computed tomography scan showed superior mesenteric vein thrombosis in all of three patients.

Interventions: All patients were treated with anticoagulant for 3 or 6 months.

Outcomes: MVTs were completely resolved without any complications.

Lessons: If early diagnosis and treatment could be available, anticoagulation alone might be adequate for the treatment of SMVT associated with trauma. Early anticoagulation in patients with acute SMVT may avoid the grave prognosis observed in patients with arterial thrombosis.

Abbreviations: INR = international normalized ratio, ISS = injury severity score, MVT = mesenteric vein thrombosis, SMV = superior mesenteric vein.

Keywords: anticoagulation, mesenteric vein thrombosis, trauma

1. Introduction

Mesenteric vein thrombosis (MVT) is a rare insidious disease with a high mortality rate, estimated to occur in 5% to 15% of patients with acute mesenteric ischemia.[1–5] Its diagnosis is often delayed due to its nonspecific abdominal symptoms, low incidence, and low awareness among clinicians.[6,7] However, recent improvements and widespread use of diagnostic imaging modalities have facilitated the early recognition of this disease before laparotomy, leading to a dramatic change in its initial management.[8–10] MVT may be idiopathic or be caused by conditions responsible for thrombophilia and acquired risk factors.[8–10] To date, there have been few reports of MVT after trauma.[11] Herein we describe our experiences treating 3 patients with MVT. The ethical approval was waived and informed consents were given.

2. Case report

2.1. Patient 1

A 44-year-old man presented with upper abdominal pain after blunt abdominal trauma sustained in a motor vehicle accident. At presentation, the patient was fully conscious, had stable vital signs, and an Injury Severity Score (ISS) of 5. Initial abdominal computed tomography (CT) scan with contrast enhancement showed transverse colon mesenteric haziness with hemoperitoneum without extravasation of contrast. He was closely monitored, with frequent abdominal physical examinations, because of the possibility of colonic ischemia and delayed bowel perforation. The patient was in good condition without any complaints. A follow-up CT scan 1 week after hospitalization showed a decrease in fluid collection and improvement in mesenteric haziness; however, a previously undetected filling defect with marginal flow at the proximal superior mesenteric vein (SMV) was observed (Fig. 1A). He was diagnosed with acute superior MVT (SMVT). Because there were no contraindications to anticoagulation, he was started on anticoagulation treatment with low molecular weight heparin (LMWH, Enoxaparin; 1 mg/kg) and vitamin K antagonist (warfarin), which maintained his international normalized ratio (INR) between 2.0 and 3.0. A follow-up CT scan 1 month later

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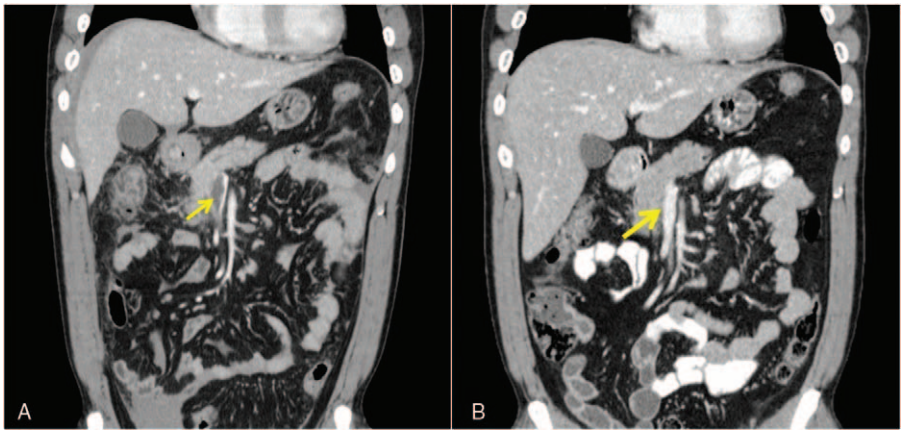

Figure 1. CT scans of patient 1 (A) 1 week after admission and (B) after 1 month of anticoagulation.

showed complete resolution of the thrombus at the proximal SMV, without any complications such as SMV stenosis or small bowel stricture (Fig. 1B). He was maintained on anticoagulation with warfarin for 6 months.

2.2. Patient 2

A 52-year-old man presented with abdominal pain after a traffic accident. At the time of the accident, he was driving the car and suffered from abdominal pain after hitting the steering wheel. Previously, he had undergone a right hemicolectomy for cancer of the ascending colon. At presentation, his vital signs were blood pressure 66/40 mm Hg, heart rate 81/min, respiratory rate 21/min, and body temperature 36.1°C. ISS was 21. Physical examination showed tenderness of the entire abdomen to palpation. An abdominal CT scan with contrast enhancement showed jejunal wall defects with free air and hemoperitoneum. Laparotomy showed transection of and mesenteric injury to the jejunum, along with bowel ischemia. He underwent segmental resection of 40 cm of the jejunum and functional side-to-side anastomosis with staplers. All injured mesenteries were repaired. His postoperative course was uneventful. A CT scan 1 week after the operation demonstrated SMVT with marginal flow (Fig. 2A). He was treated with the anticoagulant clopidogrel 75 mg/d for 3 months. A 3-month follow-up CT scan showed complete resolution of SMVT with no complications (Fig. 2B).

2.3. Patient 3

A 26-year-old man presented with multiple abdominal stab wounds. Physical examination showed evisceration of the small bowel with slight arterial bleeding at the mesentery through the stab wound in the periumbilical area, and pain in the right and left upper quadrants of the abdomen. At presentation, his vital signs were blood pressure 83/40 mm Hg, heart rate 57/min, respiratory rate 20/min, and body temperature 36.0°C. ISS was 9. Laparotomy revealed multiple perforations of the ileum, mesenteric injuries to the ileum and sigmoid colon, and injury to the retroperitoneal vessels. He underwent primary closure of the perforated ileum and repair of the injured mesentery and vessels. His postoperative course was uneventful. A 1-week follow-up CT scan showed SMVT with marginal flow (Fig. 3A). He was treated with the anticoagulant clopidogrel 75 mg/d for

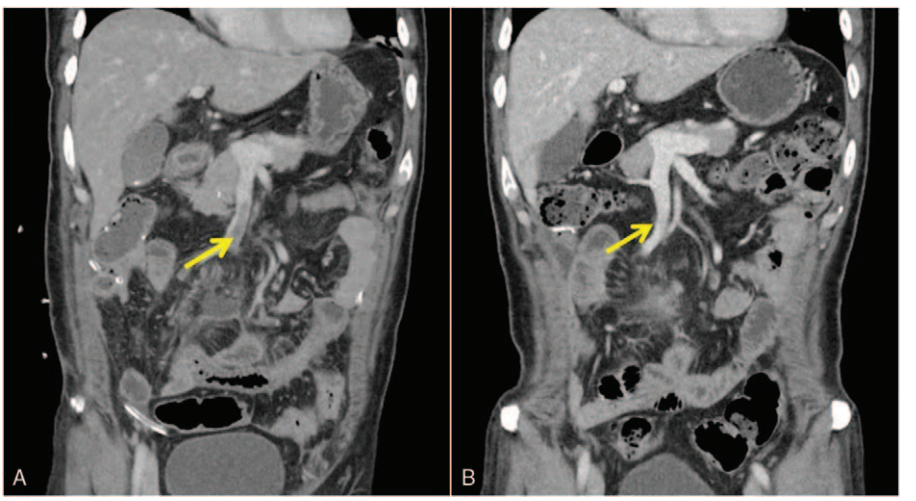

Figure 2. CT scans of patient 2 (A) 1 week after surgery and (B) after 3 months of anticoagulation.

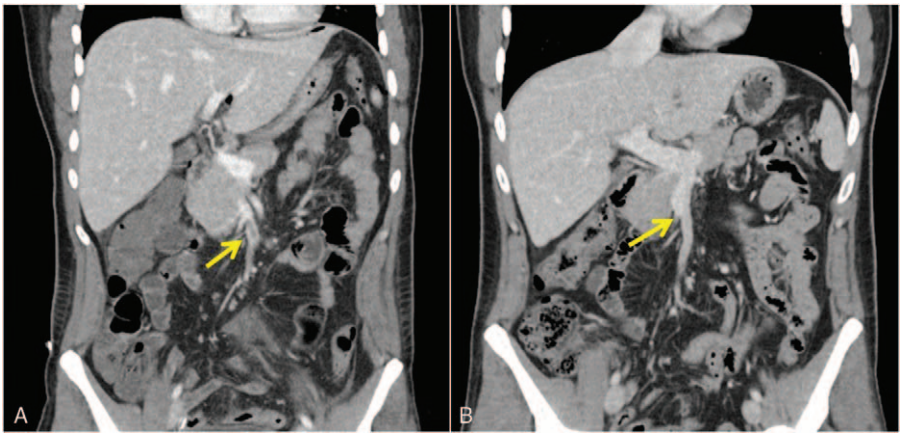

Figure 3. CT scans of patient 3 (A) 1 week after surgery and (B) after 2 months of anticoagulation.

3 months. A 2-month follow-up CT scan showed complete resolution of SMVT with no complications (Fig. 3B).

3. Discussion

MVT is a rare insidious disease with a high mortality rate. It mainly involves the SMV, although the inferior mesenteric vein is also involved in a small proportion of cases. MVT occurs in 5% to 15% of patients with acute mesenteric ischemic events.[1–5] A systematic review of the available literature from 1966 to 2002 revealed that MVT was the cause of acute mesenteric ischemia in just 2.9% of patients.[12] Because the SMV does not have collateral vessels, its complete obstruction accompanied by improper venous drainage results in bowel engorgement and ischemia. Arterial vasospasm may also cause bowel ischemia and infarction of venous origin.

The causes of MVT can be classified as primary, idiopathic, or secondary. The most frequent causes of secondary MVT are prothrombotic states due to inherited or acquired disorders of coagulation, such as antithrombin III deficiency, protein C and S deficiencies, factor V Leiden mutation, prothrombin G20210A mutation, hyperhomocysteinemia, activated protein C resistance, lupus anticoagulants, and antiphospholipid antibodies. Other causes include prothrombotic states resulting from cancer, intraabdominal inflammatory states, pregnancy, trauma, postoperative condition, cirrhosis, and portal hypertension.[13,14] Oral contraceptive use is responsible for 9% to 18% of MVTs in young women. To exclude the likelihood of inherited coagulation disorders, hypercoagulation tests are usually repeated 2 weeks after the discontinuation of anticoagulation because the results of these tests are affected by acute-stage thrombosis and anticoagulants. Inherited thrombophilia was ruled out in all 3 of our patients by the absence of abnormal findings on hypercoagulation tests.

The clinical manifestations of MVT are largely determined by the location and extent of the thrombus, the size of the involved vessels, the depth of bowel-wall ischemia, and the timing of thrombus formation within the splanchnic vasculature. Clinical manifestations of ischemia confined to the mucosa include abdominal pain and diarrhea. However, disease progression and the development of transmural ischemia can result in hematemesis, hematochezia, melena, bowel perforation, and peritonitis. MVT can be classified as acute, subacute, or chronic. Acute MVT is associated with colicky and severe midabdominal pain lasting for at least a few hours, with a definite risk of bowel infarction and peritonitis. Although subacute MVT is also associated with prominent abdominal pain, bowel infarction and variceal hemorrhage are less likely. Abdominal pain is rare in patients with chronic MVT because of extensive venous collateral circulation.

The duration of symptoms before treatment has a significant impact on patient outcomes, including mortality rate and the requirement for laparotomy. Although symptom duration varies before patients seek medical care, the average symptom duration before presentation ranges from 5 to 14 days, with >75% of patients presenting after having symptoms for >48 hours.[14] Advances in diagnostic modalities, increased awareness of MVT, and increased utilization of contrast-enhanced CT scanning in emergency department patients with abdominal pain have shortened the time from initial symptoms to MVT diagnosis from 1 week to 1 day.[1,3]

Acute MVT occurs most frequently in the ileum (64%–83%) and jejunum (50%–81%), followed by the colon (14%) and duodenum (4%–8%). The colon is thought to be less affected than other parts of the gastrointestinal tract because of its collateral circulation via the left renal vein, splenic vein, and inferior hemiazygous system.[14]

Routine laboratory blood tests have some limitations in the diagnosis of MVT. Although increased serum lactate concentrations and metabolic acidosis may help identify patients with established bowel infarction, no specific plasma biomarkers are currently available to identify patients at risk for intestinal ischemia or infarction.[5,6]

Transabdominal color Doppler ultrasonography may reveal thrombi in the mesenteric veins. Abdominal CT scanning with adequate portal vein phase contrast was found to be the most reliable modality for diagnosing MVT, with a sensitivity of 90%.[5,14] Selective mesenteric angiography, although more invasive, can more accurately distinguish between arterial and venous forms of mesenteric ischemia. This modality may better reveal thrombi in the larger veins, or there may be late visualization of the SMV. The therapeutic strategy for trauma patients in our center includes routine follow-up CT scanning after 1 week to evaluate posttraumatic and postoperative patients' status. Therefore, we could early identify the SMVT on all of 3 asymptomatic patients.

The treatment of MVT depends on disease stage and patient condition. Recently, treatment of patients with acute SMVT has shifted to early anticoagulation with nonsurgical approaches and selective exploration. The current standard therapy in patients diagnosed with MVT includes immediate heparinization with unfractionated heparin or LMWH. Immediate anticoagulation with heparin early in the course of the disease increases survival rate and decreases recurrence rate.[3] Oral anticoagulation with warfarin should be initiated if there is no evidence of ongoing ischemia. In the absence of an ongoing thrombotic disorder, the duration of anticoagulation should be limited to 6 to 12 months.[5] Zeng et al reported that 94% of the patient with acute SMVT had clinical improvement with anticoagulant therapy with argatroban, a direct thrombin inhibitor, suggesting that early treatment with argatroban may be an effective and safe therapy in acute SMVT.[3] In our cases, all 3 patients had no symptoms, but SMVT was early diagnosed by routine follow-up CT and then all of them were successfully treated with anticoagulation treatment alone.

MVT can also safely be managed by percutaneous angiotherapy without surgical exploration. Thrombolytic agents such as urokinase or tissue plasminogen activator can be injected directly into the thrombus in selected patients. The use of thrombolytic agents is restricted by the risk of hemorrhage and the low rate of success in patients with a delayed diagnosis.[5]

Surgical management depends on operative findings and can range from a segmental infarction of the small bowel to necrosis of the entire bowel or perforation.[5] A second-look laparotomy in patients with extensive bowel infarction and some venous flow may avoid the resection of any bowel segment that may be viable. Thrombectomy can be performed successfully when the thrombus is new and is limited to the SMV.

Although MVT was formerly associated with a high mortality rate, ranging from 20% to 50%, the mortality rate has been reduced by early diagnosis and the prompt use of anticoagulants, as well as surgery in selected patients.[8] Survival depends on various factors, including age, coexisting illnesses, and the timing of the diagnosis and surgical intervention.

In conclusion, if early diagnosis and treatment could be available, anticoagulation alone might be adequate for the treatment of SMVT associated with trauma. Early anticoagulation in patients with acute SMVT may avoid the grave prognosis observed in patients with arterial thrombosis.

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