

CASE REPORT

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The formation of portal venous system thrombosis after blunt abdominal trauma: a case report

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Abstract

Introduction Portal venous system thrombosis accompanied by intestinal infarction is a rare complication following blunt abdominal trauma. It is known to be caused by liver cirrhosis. Herein, we describe the clinical manifestations and treatment of portal venous system thrombosis in a patient, confirmed by imaging and pathology.

Case presentation A 38-year-old Chinese woman presented with abdominal pain and vomiting after a car accident. Portal venous system thrombosis without other thrombophilic states was diagnosed via computed tomography angiography after 2 months. The patient developed small bowel infarction and received successful treatment via anticoagulation and surgery.

Conclusion This report demonstrates that vascular injury, including both hemorrhage and ischemia, should be considered in the differential diagnosis after abdominal trauma. Clinicians should be aware of portal venous system thrombosis following acute abdomen, especially when clinical presentations do not correspond to common situations. Early anticoagulation therapy can improve prognosis once the diagnosis is established.

Keywords Portal venous system thrombosis, Blunt abdominal trauma, Mesenteric vein thrombosis, Intestinal infarction

Introduction

Portal venous system thrombosis (PVST) is a relatively uncommon disease and is typically considered a complication of liver cirrhosis. It can also be detected in patients with abdominal infection, malignant abdominal tumor, or hematological disease. Other possible iatrogenic causes include abdominal surgery and oral contraceptive usage. The manifestations of this disease are diverse and nonspecific, and are mainly related to the location, extent, and duration of thrombosis. It is predominantly characterized by portal hypertension and intestinal

ischemic infarction. Blunt abdominal trauma most commonly involves parenchymal organs and bowels. Clinicians should be aware of PVST as a vascular complication following blunt abdominal trauma.

Case presentation

A 38-year-old Chinese woman with intermittent epigastric colic pain for 8 weeks, and vomiting and melena for 1 week, was admitted to our hospital. Before the onset of abdominal pain, the patient sustained an injury in a car accident; her abdomen was impacted, but not seriously. She initially received proton pump inhibitors and antispasmodic agents after developing abdominal pain but experienced increasingly severe abdominal pain with intermittent vomiting and melena. She denied alcohol consumption and oral contraceptive use, and had no history of genetic diseases. On physical examination, the

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patient appeared mildly anemic and had slight tenderness and rebound tenderness in the left epigastric region. Her blood routine examination revealed decreased hemoglobin (97 g/L) and normal leukocyte and platelet counts. Results of her liver function, coagulation function, hepatitis B surface antigen, and hepatitis C antibody tests were normal. Gastroscopy revealed normal images of the esophagus and stomach. X-ray imaging revealed incomplete obstruction of the proximal jejunum. Computed tomography angiography (CTA) revealed that the mesenteric vein, splenic vein, and left branch of portal vein were not visualized, and multiple collateral circulations were observed (Fig. 1).

PVST complicated by intestinal infarction was diagnosed, and the patient received warfarin therapy for

1 month without clinical improvement. Second-look CTA was performed to confirm persistent thrombosis in the portal venous system and circulatory disturbance of the intestine (Fig. 1). Enterectomy was performed and revealed extensive intraperitoneal adhesion formation, 10 cm stenosis of the jejunum near the ligament of Treitz, and hemorrhage and edema of the local bowel wall. Pathology revealed chronic purulent inflammation of the mucosa, and dilation and congestion of the submucosal vessels (Fig. 2). The patient continued taking warfarin orally for half a year after the operation and achieved complete symptom remission with no adverse effects during follow-up. Color Doppler ultrasound did not reveal progression of portal vein thrombosis at the local hospital.

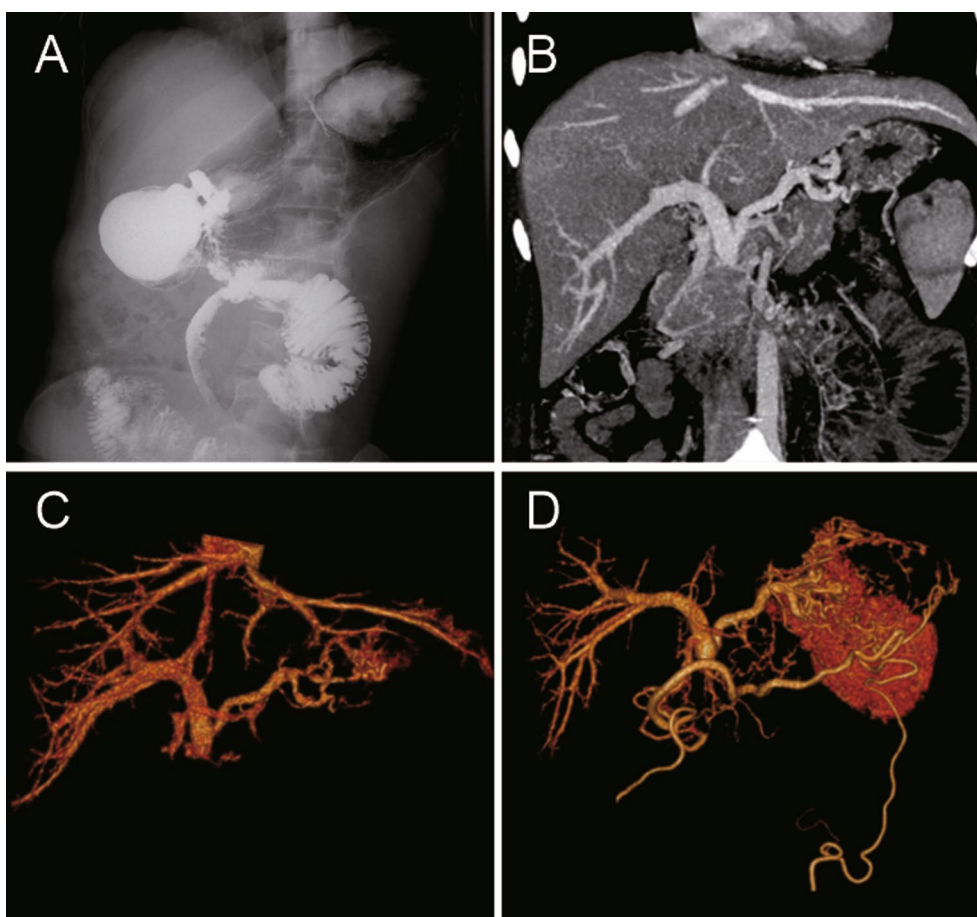


Fig. 1 **A** The X-ray imaging showed that the mucosal folds of the proximal jejunum disappeared, the bowel looked like a lead pipe, and the barium was impeded when passing through. **B** and **C** The computed tomography angiography showed the left branch of portal vein, superior mesenteric vein, and splenic vein were totally clotted, and multiple collateral vessels were observed in the gastric submucosa and epigastric area. **D** The second three-dimensional reconstruction of portal venous system thrombosis showed that all the veins were still clotted, and the collateral vessels were more obvious than those in the first reconstruction

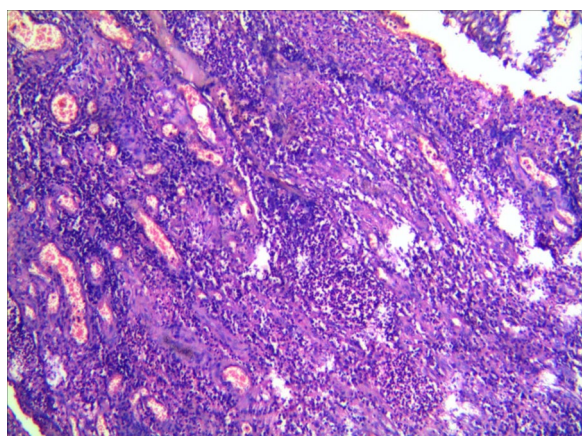


Fig. 2 Pathology revealed chronic purulent inflammation of the mucosa, and dilation and congestion of the submucosal vessels, consistent with infarction of the small intestine (hematoxylin-eosin stain, 200x)

Discussion

Liver cirrhosis, solid cancer, myeloproliferative neoplasm, abdominal inflammation, and abdominal surgery are common causes of splanchnic vein thrombosis [1]. The mechanisms of thrombosis are Virchow's triad, which includes blood stasis, endothelial injury, and hypercoagulability [2]. PVST resulting from blunt abdominal trauma is rare, and only a few cases have been reported. The mechanism of post-traumatic thrombosis may be attributed to vascular endothelial damage caused by shearing forces, which initiates local thrombosis that can propagate throughout the portal venous system, as observed in laparoscopic splenectomy [3, 4].

With respect to abdominal trauma patients, clinicians often prioritize acute abdomen concerns such as organ rupture/perforation and active bleeding. Non-bleeding vascular injury in the abdominal cavity is usually overlooked. The patient in this case did not have significant abdominal symptoms or signs immediately after abdominal trauma, and late-stage abdominal pain, vomiting, and melena were mistakenly attributed to post-traumatic neuropathy and peptic ulcers. The diagnosis of PVST formerly depended on exploratory laparotomy but has shifted to radiological imaging examinations [5]. The CTA has the highest sensitivity (96%) and specificity (94%) [6] among imaging modalities, and can aid in accurate diagnosis, particularly when vascular lesions are suspected.

Her main manifestation was intestinal infarction due to superior mesenteric vein occlusion. Therefore, thrombosis treatments include anticoagulation, interventional, and surgical therapies. Once diagnosed, anticoagulation therapy should be initiated promptly, unless contraindicated.

Early anticoagulation can prevent thrombi from progressing and improve prognosis [7]. For acute thrombosis, interventional thrombolysis may be considered and can help patients achieve symptomatic remission quickly and avoid surgery [8]. Enterectomy is a routine treatment for intestinal infarction. Despite receiving warfarin therapy, the patient missed the optimal time window and did not achieve remission. Owing to the irreversible nature of intestinal ischemic injury, the patient required surgery.

Conclusion

Based on the strong temporal relationship between the injury and disease onset, we concluded that blunt abdominal trauma was the likely cause of portal vein thrombosis after ruling out other potential etiologies. The diagnosis of PVST is often delayed, resulting in a 13% mortality rate within 30 days [9]. Early diagnosis and anticoagulation can improve prognosis.

Abbreviations

PVST Portal venous system thrombosis
CTA Computed tomography angiography

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Not applicable.

Author contributions

HW received the patient in the inpatient department and provided medical records. ZW carried out the case and literature review, and drafted the manuscript. HT edited and revised the manuscript. All the authors have read and approved the final manuscript.

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Availability of data and materials

Not applicable.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Competing interests

The authors declare that they have no competing interests.

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References

1. Ageno W, Riva N, Schulman S, et al. Long-term clinical outcomes of splanchnic vein thrombosis: results of an international registry. *JAMA Intern Med.* 2015;175(9):1474–80.
2. Singal AK, Kamath PS, Tefferi A. Mesenteric venous thrombosis. *Mayo Clin Proc.* 2013;88(3):285–94.
3. Gopal S, Smith I, Malka V. Acute portal venous thrombosis after blunt abdominal trauma. *Am J Emerg Med.* 2009;27(3):372.e371-372.e373.
4. James AW, Rabl C, Westphalen AC, Fogarty PF, Posselt AM, Campos GM. Portomesenteric venous thrombosis after laparoscopic surgery - a systematic literature review. *Arch Surg.* 2009;144(6):520–6.
5. Zhang J, Duan ZQ, Song QB, Luo YW, Xin SJ, Zhang Q. Acute mesenteric venous thrombosis: a better outcome achieved through improved imaging techniques and a changed policy of clinical management. *Eur J Vasc Endovasc Surg.* 2004;28(3):329–34.
6. Horton KM, Fishman EK. Multidetector CT angiography in the diagnosis of mesenteric ischemia. *Radiol Clin North Am.* 2007;45(2):275–88.
7. Alvi AR, Khan S, Niazi SK, Ghulam M, Bibi S. Acute mesenteric venous thrombosis: improved outcome with early diagnosis and prompt anticoagulation therapy. *Int J Surg.* 2009;7(3):210–3.
8. Wang MQ, Liu FY, Duan F, Wang ZJ, Song P, Fan QS. Acute symptomatic mesenteric venous thrombosis: treatment by catheter-directed thrombolysis with transjugular intrahepatic route. *Abdom Imaging.* 2011;36(4):390–8.
9. Abu-Daff S, Abu-Daff N, Al-Shahed M. Mesenteric venous thrombosis and factors associated with mortality: a statistical analysis with five-year follow-up. *J Gastrointest Surg.* 2009;13(7):1245–50.

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