

Case Report

Acute portal vein thrombosis after radical operation for gastric cancer: a case report

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Abstract: Portal vein thrombosis (PVT), the onset of which is often slow, commonly occurs in patients with basic hepatic cirrhosis and the consequent splenectomy and hepatectomy. Acute PVT is a rare but potentially life-threatening disease. We report a case of a 50-year-old male gastric cancer patient without liver cirrhosis, who suffered from a rare complication of acute PVT after a D2 radical operation. He received comprehensive treatments, including anticoagulation therapy, after suffering acute PVT, and he finally recovered. We hypothesized that the onset of acute PVT was associated with the tumor and abdominal surgery. However, to clarify its pathogenesis and treatment better, more cases must be accumulated and further explored in depth.

Keywords: Case report, gastric cancer operation, acute portal vein thrombosis

Introduction

Portal vein thrombosis (PVT) mainly occurs in liver cirrhosis-related diseases [1, 2], and its onset is often insidious and less sudden. Som R, Rikabi S [3]. It mainly occurs after several surgeries, such as liver transplantation, splenectomy, portosystemic shunt surgery, and bariatric surgery [4, 5]. Here, we report one case of acute PVT complication after radical gastrectomy, which was not found to be described in the literature. We analyzed the potential pathogenesis of its onset, its treatment and the literature to provide references for future work.

Case presentation

A male patient aged 50 years old from Huzhou City, Zhejiang Province, China was admitted to our digestive department on June 27, 2016 (admission No: 00818629), due to "melena for 4 days". The patient reported no "hepatitis" and other significant past medical histories. His physical exam showed normal vital signs. The fecal occult blood test (OBT) indicated 4+. On the day of admission, gastroscopy revealed a ball-like, raised mucous membrane (3.0×3.5 cm) and an ulcer (1.5×1.0 cm) on the stomach.

A routine section test indicated a poorly differentiated solid adenocarcinoma on June 30. An abdominal computed tomography (CT) on June 30 indicated a metastatic tumor on the greater curvature of the gastric body, with adjacent lymphadenectasis (see **Figure 1**). After transfer to the surgery department, the findings from exploratory laparotomy performed under general anesthesia on July 11 were as follows: the tumors were located on the lesser curvature of the stomach body, each with a size of approximately 2.5×2 cm and 4×3.5 cm; the tumors had infiltrated out of the serous layer; lymphadenectasis was evident around the stomach and cardia and on the liver and duodenum; no obvious metastatic nodules and ascites were observed in the abdominal and pelvic cavities. The patient underwent total gastrectomy, D2 lymph node dissection and Roux-en-Y esophagojejunostomy. During the operation, no secondary injuries involving the portal veins, splenic veins and spleen were revealed; the amount of bleeding was approximately 100 ml; the operative duration was approximately 150 minutes, and the vital signs were stable. The recovery was successful after the operation. The pathological test results after the operation are shown in **Figure 2**. No complications

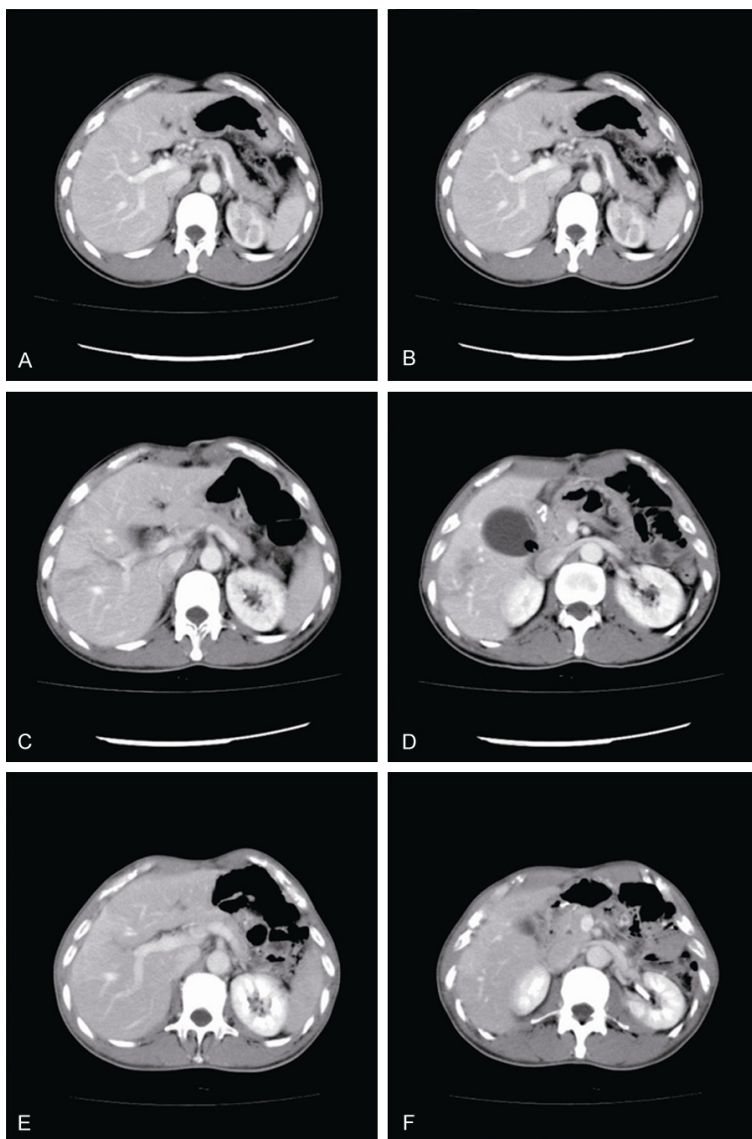


Figure 1. Abdominal CT. CT (A, B) indicated the following before the operation on June 30: metastatic tumors on the greater curvature of the gastric body, adjacent lymphadenectasis and normal vessels arranged in the liver. CT (C, D) on July 12, postoperation for total gastrectomy showed the following: thrombosis in the right portal vein branches, corresponding ischemic changes in the liver parenchyma. CT (E, F) on November 10 postoperation for total gastrectomy suggested the following: improvement of the thrombosis in the right portal vein branches compared with that on July 18, 2016; corresponding changes in the liver parenchymal ischemia, as before.

such as bleeding and leaking in the abdominal cavity were observed, and the vital signs were stable after the operation. However, severe impairment of the liver function was suggested in the blood test report on the first day after the operation (see **Figure 3**). On the 2nd day, the CT examination revealed main portal vein thrombosis, which involved its left and right branches. Because a diagnosis of acute PVT complica-

tion was made, anticoagulation therapy was immediately initiated. Low-molecular-weight heparin (LMWH), (i.e., 60 mg enoxaparin every 12 hours) was injected subcutaneously for 7 days and subsequently transitioned to oral anti-coagulation with warfarin (approximately 10 mg every day and adjusted according to the INR test results). Other treatments were also given to the patient, such as protecting the liver function, preventing infection, and supplementing enough fluid volume and early enteral nutrition. Then, the PVT process in the patient was terminated; the liver function was gradually improved, and the postoperative rehabilitation was successful. The patient was discharged after 2 weeks. The patient was followed-up until the present. His liver function has been restored to normal, and an imaging examination indicated that the PVT has been absorbed (see **Figure 1**).

Discussion

Cancer embolus and thrombosis are most common in portal vein thrombosis [6]. The portal vein thrombosis in this patient was ultimately absorbed, which excluded the possibility of a portal vein cancer embolus. The common thrombotic factors are as follows: hemodynamic changes, vascular wall damage, blood hypercoagulable state, etc [6, 7]. Overall, the risk factors of portal vein thrombosis are numerous and complex [6-9].

This patient had no history of liver cirrhosis, inflammation, blood system diseases, portal vein malformation, etc. We speculated that the onset of acute PVT may be correlated with the following two key factors: 1. Tumors. The infiltration of tumor cells can damage vascular

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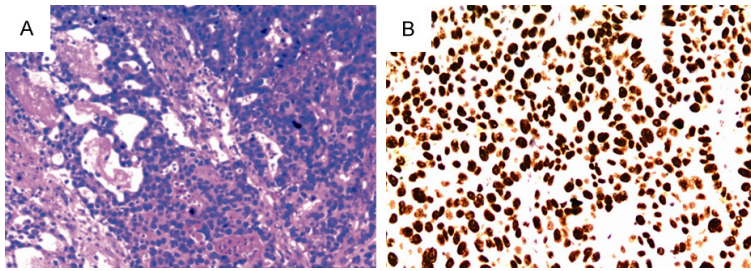


Figure 2. Pathology results: immunohistochemistry results were shown as follows: P53(3+), Ki-67(+>90%), CK(+), CEA(+), E-cadherin(3+), Topo-II(2+), CerbB-2(2+), CgA(-), and Syn(-). Diagnosis: 1. Multiple raised and poorly differentiated adenocarcinomas on the lesser curvature of the gastric body (two sites: 2.6×1.7 cm and 3.9×3.6 cm) infiltrated into the fatty tissues outside the serous layer. 2. Metastatic situation of the perigastric lymph nodes: the gastric lesser curvature group (6/15).

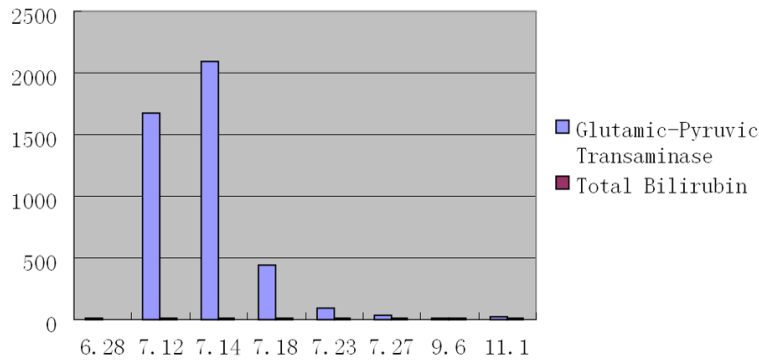


Figure 3. Main indexes of the changes in the liver function: glutamic-pyruvic transaminase (GPT) was normal on June 28 pre-operation, and the GPT was up to 1673.3 on July 12 on the first day after the operation, reached its peak on July 14, and then gradually returned to normal. Bilirubin always remained in the normal range.

endothelial cells [8, 9]; Blood plasma in tumor patients has a many and various factors promoting fibrination; in addition, fibrinolysis appears in tumors. Precursors of thrombosis suggested by the above mechanisms may explain why vessels in tumor patients easily induce thrombosis [10]. As for the causes of acute PVT of this patient with advanced gastric cancer it is difficult to exclude tumor factors, which are regarded as one of the prothrombotic disorders. 2. Abdominal surgery. During the abdominal operation, bleeding and insufficient fluid replacement can cause slow blood flow in the portal vein system, microcirculatory obstacles, ischemia and hypoxia in the local region and acid intoxication reducing red cell deformability cause high blood viscosity at high shear rates [11, 12]. Although the patient had only a little bleeding, no portal vein injury and a stable cir-

ulation during the operation, he was still in a hypercoagulable state. Meanwhile, he also had symptoms of a prethrombotic state. Therefore, the risk for acute PVT increased. We believed that these two factors contributed to the development of portal vein thrombosis, although the specific cause remains to be further identified.

Limited lesions of acute PVT may cause abdominal pain, abdominal distension, vomiting, and other signs and symptoms [13]. Along the disease progression, the mortality reaches up to 50% without timely treatment [14, 15]. The onset of acute PVT occurred in this patient after the operation, and the symptoms were masked by postoperative discomfort. However, severe liver function damage was observed by laboratory examinations (see Figure 3), and PVT and corresponding hepatic ischemia changes were revealed by CT examinations (Figure 1). In patients with acute PVT, an individualized treatment based on the clinical presenta-

tion, the underlying disease, and the extent of the thrombosis is mandatory. In the present case, anticoagulation therapy was started immediately. Considering that PVT in the patient only existed in some parts of the trunk and right branch and did not involve the superior and inferior mesenteric veins, we first subcutaneously injected the patient with LMWH and then gave him warfarin, an oral anticoagulant, 7 days later. In addition, other relevant treatments were given [16, 17]. The PVT process in the patient was terminated, with liver function gradually improving and returning to normal (see Figure 3); superior treatment effects were obtained. Postoperative rehabilitation was successful, and the patient was discharged after 2 weeks. The patient was followed-up until the present, and normal liver function has been detected. Imaging findings suggested th-

at the PVT was absorbed. However, the acute PVT led to partial necrosis of the liver cells, which is irreversible. The CT still showed partial liver tissue ischemia 5 months after the complication occurred.

For patient cases complicated by acute PVT, we believe that clinicians should control the possible risk factors of PVT before the operation and enhance the protective awareness of the portal veins during the operation. When the diagnosis of acute PVT is made, an individualized treatment (especially anticoagulation therapy) should be considered [12, 15, 18, 19]. Certainly, such a rare complication has not been reported in previous reports. Hence, its pathogenesis, prevention, diagnosis and treatment are worthy of further attention and analysis.

Acknowledgements

This study adhered to the tenets of the Declaration of Helsinki. Informed consent was signed by the patient for publication of this report and its related images.

Disclosure of conflict of interest

None.

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References

- [1] Valla D. Splanchnic vein thrombosis. *Semin Thromb Hemost* 2015; 41: 494-502.
- [2] Dai J, Qi X, Peng Y, Hou Y, Chen J, Li H and Guo X. Association between D-dimer level and portal venous system thrombosis in liver cirrhosis: a retrospective observational study. *Int J Clin Exp Med* 2015; 8: 15296-15301.
- [3] Som R, Rikabi S, Chang A, Durkin N and Ramar S. Portal vein thrombosis following laparoscopic gastric plication. *Ann R Coll Surg Engl* 2017; 99: e6-e7.
- [4] AlSabah SA, AlRuwaished M, Almazeedi S, Al Haddad E and Chouillard E. Portomesenteric vein thrombosis post-laparoscopic sleeve gastrectomy: case series and literature review. *Obes Surg* 2017; 27: 2360-2369.
- [5] Caruso F, Cesana G, Lomaglio L, Cioffi S, Ciccarese F, Uccelli M and Olmi S. Is portomesenteric vein thrombosis after laparoscopic sleeve gastrectomy related to short-course prophylaxis of thromboembolism? a monocentric retrospective analysis about an infrequent but not rare complication and review of the literature. *J Laparoendosc Adv Surg Tech A* 2017; 27: 987-996.
- [6] Kobilica N, Skalicky M, Milotic F and Flis V. Non-cirrhotic and non-malignant acute extrahepatic portal vein thrombosis (PVT): short- and long-term results. *J Int Med Res* 2011; 39: 1090-1098.
- [7] Zhao L, Li C, Shao R and Fang Y. Risk indicators for venous thrombosis in first-degree relatives of patients with recurrent venous thromboembolism in Chinese. *Medicine (Baltimore)* 2016; 95: e4539.
- [8] Perez-Bru S, Nofuentes-Riera C, Garcia-Marin A, Luri-Prieto P, Morales-Calderon M and Garcia-Garcia S. [Pylephlebitis: a rare but possible complication of intra-abdominal infections]. *Cir Cir* 2015; 83: 501-505.
- [9] Harding DJ, Perera MT, Chen F, Olliff S and Tripathi D. Portal vein thrombosis in cirrhosis: controversies and latest developments. *World J Gastroenterol* 2015; 21: 6769-6784.
- [10] Melikyan AL, Sukhanova GA, Vakhrusheva MV, Subortseva IN and Orel EB. [Experience in treating portal thromboses in patients with chronic myeloproliferative diseases]. *Ter Arkh* 2016; 88: 89-95.
- [11] Hall TC, Garcea G, Metcalfe M, Bilku D and Dennison AR. Management of acute non-cirrhotic and non-malignant portal vein thrombosis: a systematic review. *World J Surg* 2011; 35: 2510-2520.
- [12] Boddi M, Villa G, Chiostrri M, De Antoniis F, De Fanti I, Spinelli A, Savino A, Gensini GF and Pelagatti C. Incidence of ultrasound-detected asymptomatic long-term central vein catheter-related thrombosis and fibrin sheath in cancer patients. *Eur J Haematol* 2015; 95: 472-479.
- [13] Plessier A, Darwish-Murad S, Hernandez-Guerra M, Consigny Y, Fabris F, Trebicka J, Heller J, Morard I, Lasser L, Langlet P, Denninger MH, Vidaud D, Condat B, Hadengue A, Primignani M, Garcia-Pagan JC, Janssen HL, Valla D; European Network for Vascular Disorders of the Liver (EN-Vie). Acute portal vein thrombosis unrelated to cirrhosis: a prospective multicenter follow-up study. *Hepatology* 2010; 51: 210-218.
- [14] Pannach S, Babatz J and Beyer-Westendorf J. Successful treatment of acute portal vein thrombosis with rivaroxaban. *Thromb Haemost* 2013; 110: 626-627.

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- [15] Loss M, Lang SA, Uller W, Wohlgemuth WA and Schlitt HJ. Combined surgical and interventional therapy of acute portal vein thrombosis without cirrhosis: a new effective hybrid approach for recanalization of the portal venous system. *J Am Coll Surg* 2014; 218: e79-86.
- [16] Gorski U, Gupta P, Kalra N, Kang M, Singh R, Gupta R, Gupta V and Khandelwal N. Multidetector computed tomography evaluation of post cholecystectomy complications: a tertiary care center experience. *Trop Gastroenterol* 2015; 36: 236-243.
- [17] Martinez M, Tandra A and Vuppalaanchi R. Treatment of acute portal vein thrombosis by nontraditional anticoagulation. *Hepatology* 2014; 60: 425-426.
- [18] Wani ZA, Bhat RA, Bhadoria AS and Maiwall R. Extrahepatic portal vein obstruction and portal vein thrombosis in special situations: Need for a new classification. *Saudi J Gastroenterol* 2015; 21: 129-138.
- [19] Qi X, De Stefano V, Su C, Bai M, Guo X and Fan D. Associations of antiphospholipid antibodies with splanchnic vein thrombosis: a systematic review with meta-analysis. *Medicine (Baltimore)* 2015; 94: e496.