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Traumatic Injury to the Portal Vein With Shock Bowel

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A portal vein aneurysm is the dilatation of the portal vein due to a defect in the vein wall. This rare disease manifestation is difficult to predict and has the potential for severe complications. We describe the case of a 68-year-old man involved in a motor vehicle collision who presented with abdominal hemorrhage found on ultrasound, hypotension, and vague abdominal pain. The patient underwent an exploratory laparotomy to control bleeding. Surgery and a subsequent abdominal computed tomography revealed the presence of a portal vein pseudoaneurysm and shock bowel. This case highlights the importance of radiologists to consider the prospect of portal vein aneurysm in the differential diagnosis of hypotension following abdominal trauma.

Introduction

We present the case of a 68-year-old man with a traumatic portal vein pseudoaneurysm with subsequent shock bowel. First described by Brazilai and Kleckner in 1956,[1] a portal vein aneurysm is a rare complication of either congenital or acquired portal vein wall defects. The disease is diagnosed through imaging and rupture carries a poor prognosis. Treatment is centered on surgical intervention for symptomatic patients.

Case

A 68-year-old man was brought into the emergency department after driving into a utility pole while intoxicated. The patient complained of diffuse abdominal pain and became hypotensive. A focused assessment with sonography for trauma examination revealed the presence of blood and no apparent pelvic thoracic or thoracic injuries were found on x-ray. A left subclavian vein double lumen catheter and a right radial arterial line were placed and massive transfusion protocol was initiated.

An emergent exploratory laparotomy was performed to address the patient's internal bleeding. A laceration spanning the left and right lobes of the liver was repaired. Bleeding at the mesocolon was also controlled by packing and the devascularized colon segment was resected (Fig. 1 and 2). During the procedure, the patient's blood pressure began to stabilize and a portal vein injury became apparent. An initial consult placed to interventional radiology was subsequently delayed and the hemorrhage was controlled. It was decided to place a temporary abdominal wound vacuum-assisted closure (VAC) and continue patient resuscitation in the intensive care unit.

The patient had an abdominal CT that revealed the presence of a post-traumatic portal vein pseudoaneurysm and shock bowel (Fig 3). In the intensive care unit, the patient's wound VAC began to fill with blood and surgical re-exploration was initiated. Bleeding from the anterior surface of the portal vein was controlled and an open cholecystectomy with an intraoperative cholangiogram was performed. In addition, further bleeding from the right lateral portal vein and left lobe of the liver was repaired during the procedure. It was decided to reapply a wound VAC for temporary abdominal closure. An attempt to reanastomose the bowel the following day was abandoned due to the patient's critical condition. Unfortunately, the patient soon succumbed to his injuries.

Discussion

A portal vein aneurysm is characterized by the focal saccular or fusiform dilatation of the portal vein.[2,3] The phenomenon occurs in 0.6 per 1000 persons and makes up 3% of all venous aneurysms.[2,3] The aneurysm has been described occurring at intrahepatic and extrahepatic branching points or areas of confluence.[3,4] In particular, the main portal vein, junction of the superior mesenteric vein and the splenic vein, and the hepatic hilum are common aneurysm sites.[4]

The etiology of portal vein aneurysms has not been completely elucidated. However, congenital cases are suspected to be due to failure of distal vitelline vein regression, variant vitelline vein branching, or vein wall weakness.[1,4,5] Patients may also acquire a portal vein aneurysm through portal hypertension, pancreatitis, abdominal trauma, malignant invasion, or thrombophilia.[1,4,5] Portal vein aneurysms have a nonspecific presentation that may include vague abdominal pain, gastrointestinal bleeding, obstructive

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FIG 1. Gross surgical specimen of resected infarcted liver. (Color version of the figure available online.)

jaundice, or incidental findings on imaging. Our patient presented with a portal vein pseudoaneurysm stemming from abdominal trauma and complained of diffuse abdominal pain.[1]

The differential diagnosis for a patient presenting with diffuse abdominal pain following severe abdominal trauma is extensive. An extrahepatic portal vein aneurysm is defined by a diameter greater than 20 mm on imaging.[6] Color Doppler sonography is a primary diagnostic tool and an aneurysm is characterized by the presence of an internal nonpulsatile monophasic waveform.[6] Multidetector contrast enhanced CT is used for more specific localization and surgical planning.[3,6] Moreover, transjugular hepatic venography enables the physician to assess for portal hypertension and help define the patient's vascular anatomy.[3,6]

Shock bowel is a CT finding primarily associated with post-traumatic hypovolemic shock complex.[7,8] It is characterized by diffuse small bowel wall thickening, mucosal enhancement, submucosal edema, and luminal dilatation >2 cm.[7,8] Hypovolemia causes increased sympathetic activation and splanchnic vasoconstriction that ultimately increases bowel wall permeability.[8]

The management of a portal vein aneurysm reflects the patient's disease status. Asymptomatic patients are primarily observed for aneurysm growth.[5] Anticoagulation is used to treat portal vein thrombosis.[5] Symptomatic patients without portal hypertension may undergo aneurysmorrhaphy or aneuysmectomy.[5] However, the presence of portal hypertension necessitates a portocaval shunt or mesocaval shunt with or without liver transplantation.[5,6] An emerging alternative treatment is stent-graft exclusion with adjunctive embolization.[6] Furthermore, the 1 L/min flow rate of the portal vein and 70% mortality of shock bowel highlight the urgency of addressing aneurysmal rupture.[7,9] Transcatheter embolization may be used to control the ongoing hemorrhage.[2]

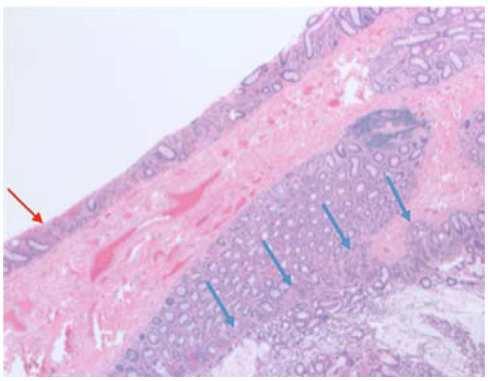

FIG 2. Low-power H&E view of resected distal colon demonstrating diffuse ischemia of the mucosal surface (red arrow) and tissue degenerative changes (blue arrows). The mucosal surface is characterized by dark regenerative crypts, lamina propria hyalinization and fibrosis, ulceration, and crypt dropout. (Color version of the figure available online.)

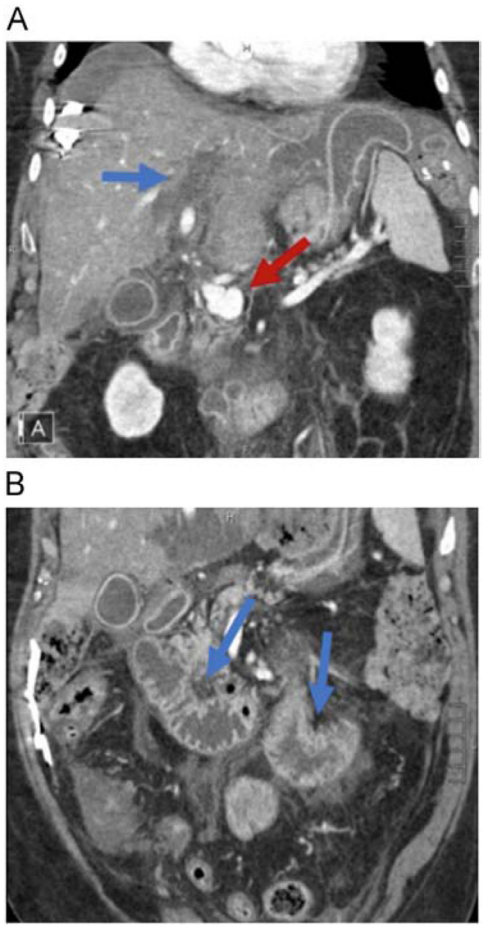

FIG 3. (A) Coronal CT image of the abdomen shows post-traumatic pseudo-aneurysm of the portal vein (red arrow) and a hepatic laceration (blue arrow). (B) Coronal CT image of the abdomen shows multiple loops of hyper-enhancing small bowel (blue arrows) consistent with shock bowel secondary to portal vein pseudo-aneurysm bleeding. (Color version of the figure available online.)

Conclusion

The clinical presentation of a portal vein aneurysm is nonspecific and ultimately imaging must be utilized to elucidate its potential for severe complications. The treatment options for patients reflect their stability and disease status. The rapid patient decompensation that frames this case highlights the consequences of aneurysmal rupture and the rapid need for hemorrhage control. Although portal vein aneurysms are rare following abdominal trauma, it should be considered in the radiologic differential diagnosis of post-traumatic hypotension with diffuse abdominal pain.

Consent

Informed consent was obtained from the patient.

References

1. Laurenzi A, Ettore GM, Lionetti R, et al. Portal vein aneurysm: What to know. Dig Liver Dis 2015;47:918–23.
2. Koc Z, Oguzkurt L, Ulusan Serife. Portal venous system aneurysms: Imaging, clinical findings, and a possible new etiologic factor. Am J Roentgenol 2007;189:1023–30.
3. Wallis A, Rogers T, Pope I, Callaway Mark. Blunt abdominal trauma—An important cause of portal venoous pseudoaneurysm. Radiol Case 2010;4(5):27–31.
4. Rafiq SA, Sitrin Michael D. Portal vein aneurysm: Case report and review of the literature. Gastroenterol Hepatol 2007;3.(4):296–8.
5. Giannoukas AD, Sfyroeras Giorgos S. Current management of visceral venous aneurysms. Phlebolymphology 2010;17(3):130–6.
6. Gaba RC, Hardman JD, Bobra Sonia J. Extrahepatic portal vein aneurysm. J Radiol Case Rep 2009;4(2):1–5.
7. Ames JT, Federle Michael P. CT hypotension complex (shock bowel) is not always due to traumatic hypovolemic shock. Am J Roentgenol 2009;192: W230–5.
8. Wang J, Liang T, Louis L, et al. Hypovolemic shock complex in the trauma setting: A pictorial review. Can Assoc Radiol J 2013;64:156–63.
9. Hamanaka K, Hirokawa Y, Itoh T, et al. Successful non-operative management of traumatic extrahepatic portal venous injury without intraperitoneal hemorrhage: A case report. Acute Med Surg 2017;4:205–8.