

Spontaneous Hemoperitoneum

George Kasotakis, MD, MPH

KEYWORDS

- Spontaneous hemoperitoneum • Rupture • Angioembolization

KEY POINTS

- Spontaneous hemoperitoneum is a rare, but life-threatening condition usually caused by nontraumatic rupture of the liver, spleen, or abdominal vasculature with underlying pathology.
- Management revolves around angioembolization or surgical intervention.
- It is typically seen in anticoagulated or coagulopathic patients and may prove rapidly fatal, if not managed appropriately.

Spontaneous hemoperitoneum (SH) is a rare, but life-threatening condition that is defined as blood within the peritoneal cavity of nontraumatic etiology.^{1,2} Given the rarity of SH, its diagnosis is almost always unsuspected until the time of imaging, which is undertaken in patients who present with acute abdominal pain and/or distention and anemia. Implicit in making this diagnosis is a nontraumatic cause, and high quality imaging is of paramount importance in identifying the underlying cause.

SH most commonly arises from hepatic, splenic, vascular or gynecologic pathology (the latter will not be discussed here, as it is outside the scope of this text), and usually in anticoagulated or coagulopathic subjects (**Box 1**).^{3,4} It requires the emergent attention of the treating clinician, as it can prove rapidly fatal, even if managed appropriately. It typically presents with signs of acute intraperitoneal bleeding, namely abdominal pain and distention, tachycardia, and even hypotension and abdominal compartment syndrome in severe cases.

Imaging is essential in cases of nontraumatic hemoperitoneum in that it establishes the diagnosis of SH and helps identify its primary etiology. Although computed tomography (CT) is the most commonly used modality in patients with acute abdominal pain, ultrasound may be used when gynecologic conditions are considered, or, less commonly, if the patient is too unstable to be transferred to the CT suite and the treating clinician is attempting to grossly localize the hemorrhage. CT, however, is superior in that it can point to a specific organ as the source of the bleeding; detect active hemorrhage (active contrast extravasation or blush in contrasted studies); and provide information on how long ago the hemorrhagic episode took place (varying Hounsfield units of fresh, clotted, and lysed blood).^{2,5}

Section of Trauma & Acute Care Surgery, Boston Medical Center, Boston University School of Medicine, 840 Harrison Avenue, Dowling 2 South, #2414, Boston, MA 02118, USA
E-mail address: gkasot@bu.edu

Surg Clin N Am 94 (2014) 65–69
<http://dx.doi.org/10.1016/j.suc.2013.10.006>

surgical.theclinics.com

0039-6109/14\$ – see front matter © 2014 Elsevier Inc. All rights reserved.

Box 1**Nongynecologic causes of spontaneous hemoperitoneum**

1. Hepatic

Benign

Adenomas

Focal nodular hyperplasias

Hemangiomas

Infiltrative diseases (amyloidosis)

Malignant

Primary hepatocellular carcinoma

Metastatic disease

Angiosarcomas

Infiltrative diseases

Amyloidosis

2. Splenic

Infections

Cytomegalovirus

EBV

HIV

Malaria

Bartonella

Malignancies

Lymphomas

Leukemias

Angiosarcomas

Infiltrative diseases

Amyloidosis

Gaucher disease

3. Vascular

Arterial

Aneurysms

Pseudoaneurysms

Mycotic aneurysms

Dissection

Venous

Pelvic veins during labor

Abdominal varices

LIVER

The liver is considered as the most common cause of SH, when gynecologic causes are not considered, with anticoagulation, pregnancy, and minor (usually unreported) trauma being the most common triggering factors. In most cases, liver masses, typically undiagnosed, rupture spontaneously and present as SH. These can be benign or malignant. The former include hepatic adenomas,⁶ focal nodular hyperplasias,⁷ large hemangiomas,⁸ or rarely infiltrative hepatic diseases such as amyloidosis.⁹ Hepatic adenomas are typically seen in pregnant⁶ or oral steroid contraceptive-using women,¹⁰ or less commonly in anabolic steroid-taking males.¹¹ Less frequently, multiple hormone-independent hepatic adenomas may outgrow their vascular supply, necrose, and eventually rupture, leading to SH. Large hemangiomas may also rupture during pregnancy, likely because of the large intravascular volume associated with gestation. Malignant hepatic lesions, either primary or metastatic, may also rupture spontaneously. In fact, hepatocellular carcinoma (HCC) constitutes the most commonly identified pathology in SH arising from the liver,¹² and when nontraumatic hemoperitoneum is seen on CT, HCC should be considered the most likely etiology, especially when an irregular mass is seen within the hepatic parenchyma. Primary hepatic angiosarcomas and metastatic disease are far less frequent causes of SH.^{12,13}

SPLEEN

Even though the spleen is the second most common solid organ to give rise to SH, spontaneous splenic rupture (SSR) is exceedingly rare.^{14,15} Unlike the liver, SSR is typically not associated with parenchymal masses, but with infectious (most notably cytomegalovirus, Epstein-Barr virus [EBV], human immunodeficiency virus [HIV], malaria, and bartonellosis)^{16–21} or inflammatory processes.^{22,23} Less commonly, infiltrative diseases (Gaucher disease, splenic amyloidosis)^{24,25} or hematologic malignancies (lymphomas, leukemias, angiosarcomas) may be the underlying pathology.^{26,27}

VASCULAR CAUSES

Vascular causes of SH include aneurysms, pseudoaneurysms, and mycotic aneurysms or arterial dissection complicated with rupture.^{2,28,29} The celiac, superior mesenteric, and renal arteries are most commonly affected,³⁰ with extensive atherosclerotic disease and vasculitis being the most commonly cited predisposing factors.^{31,32} Spontaneous arterial rupture is a catastrophic event, with mortality rates that exceed 30%.² Presence of hemoperitoneum on imaging without associated hepatic or splenic pathology typically alerts radiologists to closely evaluate the abdominal vasculature; however, pathology may not always be easily identifiable.

Less commonly, venous rupture may be the cause of SH. Common clinical scenarios include those of rupture of enlarged pelvic veins during labor or abdominal varices that have developed over time secondary to cirrhosis and portal hypertension.^{33–35} Contrary to what one might expect, prognosis after spontaneous venous bleeding is much worse compared with that of arterial etiology.

MANAGEMENT

Regardless of the underlying etiology of SH, angiography and embolization almost always constitute first-line therapy in the hemodynamically stable patient. Surgery should be considered in persistently hypotensive patients, or in those in whom interventional techniques have failed to control the bleeding. Options for hemorrhage control during surgery include, but are not limited to, repair (either primary or reinforced

with native tissue or biologic prosthetics), partial (or complete in the case of the spleen) resection, electro- and Argon beam coagulation, tissue sealants, local hemostatics, and vascular ligation.³⁶

REFERENCES

1. Furlan A, Fakhran S, Federle MP. Spontaneous abdominal hemorrhage: causes, CT findings, and clinical implications. *AJR Am J Roentgenol* 2009;193(4):1077–87.
2. Lucey BC, Varghese JC, Anderson SW, et al. Spontaneous hemoperitoneum: a bloody mess. *Emerg Radiol* 2007;14(2):65–75.
3. Ghobrial MW, Karim M, Mannam S. Spontaneous splenic rupture following the administration of intravenous heparin: case report and retrospective case review. *Am J Hematol* 2002;71(4):314–7.
4. Moore CH, Snashall J, Boniface K, et al. Spontaneous splenic hemorrhage after initiation of dabigatran (Pradaxa) for atrial fibrillation. *Am J Emerg Med* 2012;30(9):2082.e1–2.
5. Mortelet KJ, Cantisani V, Brown DL, et al. Spontaneous intraperitoneal hemorrhage: imaging features. *Radiol Clin North Am* 2003;41(6):1183–201.
6. Estebe JP, Malledant Y, Guillou YM, et al. Spontaneous rupture of an adenoma of the liver during pregnancy. *J Chir (Paris)* 1988;125(11):654–6.
7. Kleespies A, Settmacher U, Neuhaus P. Spontaneous rupture of hepatic focal nodular hyperplasia—a rare cause of acute intraabdominal bleeding. *Zentralbl Chir* 2002;127(4):326–8.
8. Corigliano N, Mercantini P, Amodio PM, et al. Hemoperitoneum from a spontaneous rupture of a giant hemangioma of the liver: report of a case. *Surg Today* 2003;33(6):459–63.
9. Battula N, Tsapralis D, Morgan M, et al. Spontaneous liver haemorrhage and haemobilia as initial presentation of undiagnosed polyarteritis nodosa. *Ann R Coll Surg Engl* 2012;94(4):e163–5.
10. Khan S, Smulders YM, de Vries JI, et al. Life-threatening complications of hormonal contraceptives: a case history. *Case Rep Obstet Gynecol* 2013;2013:186230.
11. Bagia S, Hewitt PM, Morris DL. Anabolic steroid-induced hepatic adenomas with spontaneous haemorrhage in a bodybuilder. *Aust N Z J Surg* 2000;70(9):686–7.
12. Chen ZY, Qi QH, Dong ZL. Etiology and management of hemorrhage in spontaneous liver rupture: a report of 70 cases. *World J Gastroenterol* 2002;8(6):1063–6.
13. Burke M, Opeskin K. Spontaneous rupture of the liver associated with a primary angiosarcoma: case report. *Am J Forensic Med Pathol* 2000;21(2):134–7.
14. Tataria M, Dicker RA, Melcher M, et al. Spontaneous splenic rupture: the masquerade of minor trauma. *J Trauma* 2005;59(5):1228–30.
15. Amonkar SJ, Kumar EN. Spontaneous rupture of the spleen: three case reports and causative processes for the radiologist to consider. *Br J Radiol* 2009;82(978):e1111–3.
16. Rinderknecht AS, Pomerantz WJ. Spontaneous splenic rupture in infectious mononucleosis: case report and review of the literature. *Pediatr Emerg Care* 2012;28(12):1377–9.
17. Vallabhaneni S, Scott H, Carter J, et al. Atraumatic splenic rupture: an unusual manifestation of acute HIV infection. *AIDS Patient Care STDS* 2011;25(8):461–4.

18. Bellaiche G, Habib E, Baledent F, et al. Hemoperitoneum due to spontaneous splenic rupture: a rare complication of primary cytomegalovirus infection. *Gastroenterol Clin Biol* 1998;22(1):107–8.
19. Daybell D, Paddock CD, Zaki SR, et al. Disseminated infection with *Bartonella henselae* as a cause of spontaneous splenic rupture. *Clin Infect Dis* 2004;39(3):e21–4.
20. Bansal VK, Krishna A, Misra MC, et al. Spontaneous splenic rupture in complicated malaria: non-operative management. *Trop Gastroenterol* 2010;31(3):233–5.
21. Gockel HR, Heidemann J, Lorenz D, et al. Spontaneous splenic rupture, in tertian malaria. *Infection* 2006;34(1):43–5.
22. Patel VG, Eltayeb OM, Zakaria M, et al. Spontaneous subcapsular splenic hematoma: a rare complication of pancreatitis. *Am Surg* 2005;71(12):1066–9.
23. Gandhi V, Philip S, Maydeo A, et al. Ruptured subcapsular giant haematoma of the spleen—a rare complication of acute pancreatitis. *Trop Gastroenterol* 2010;31(2):123–4.
24. Khan AZ, Escofet X, Roberts KM, et al. Spontaneous splenic rupture—a rare complication of amyloidosis. *Swiss Surg* 2003;9(2):92–4.
25. Stone DL, Ginns EI, Krasnewich D, et al. Life-threatening splenic hemorrhage in two patients with Gaucher disease. *Am J Hematol* 2000;64(2):140–2.
26. Chappuis J, Simoens C, Smets D, et al. Spontaneous rupture of the spleen in relation to a non-Hodgkin lymphoma. *Acta Chir Belg* 2007;107(4):446–8.
27. Goddard SL, Chesney AE, Reis MD, et al. Pathological splenic rupture: a rare complication of chronic myelomonocytic leukemia. *Am J Hematol* 2007;82(5):405–8.
28. Chookun J, Bounes V, Ducasse JL, et al. Rupture of splenic artery aneurysm during early pregnancy: a rare and catastrophic event. *Am J Emerg Med* 2009;27(7):898.e5–6.
29. Okada T, Frank M, Pellerin O, et al. Embolization of life-threatening arterial rupture in patients with vascular Ehlers-Danlos syndrome. *Cardiovasc Intervent Radiol* 2013. [Epub ahead of print].
30. Yoo BR, Han HY, Cho YK, et al. Spontaneous rupture of a middle colic artery aneurysm arising from superior mesenteric artery dissection: diagnosis by color Doppler ultrasonography and CT angiography. *J Clin Ultrasound* 2012;40(4):255–9.
31. Obon-Dent M, Shabaneh B, Dougherty KG, et al. Spontaneous celiac artery dissection case report and literature review. *Tex Heart Inst J* 2012;39(5):703–6.
32. Jia ZZ, Zhao JW, Tian F, et al. Initial and middle-term results of treatment for symptomatic spontaneous isolated dissection of superior mesenteric artery. *Eur J Vasc Endovasc Surg* 2013;45(5):502–8.
33. Ajmal M. Spontaneous splenic vein bleeding during pregnancy: consequences of a missed diagnosis. *J Anesth* 2012;26(6):959–60.
34. Leaute F, Frampas E, Mathon G, et al. Massive hemoperitoneum from rupture of an intra-peritoneal varix. *J Radiol* 2002;83(11):1775–7.
35. Moreno JP, Pina R, Rodriguez F, et al. Spontaneous hemoperitoneum caused by intraabdominal variceal rupture in a patient with liver cirrhosis. Clinical case. *Rev Med Chil* 2002;130(4):433–6.
36. Georgiou C, Neofytou K, Demetriades D. Local and systemic hemostatics as an adjunct to control bleeding in trauma. *Am Surg* 2013;79(2):180–7.