

Spontaneous Rupture of a Saccular Intrahepatic Artery Aneurysm

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Abstract

Hepatic artery aneurysms are the second most common visceral aneurysm but are still relatively uncommon. Over the last century, methods for treating these lesions have evolved substantially. The presented case covers the presentation, diagnosis, and treatment of a 65-year-old woman with an aneurysm of the intrahepatic portion of the hepatic artery. This case demonstrates the variety of techniques available for managing these lesions and the importance of both a thorough knowledge of the available treatments and the flexibility to switch among them when necessary.

Keywords

hepatic artery, visceral aneurysm, intrahepatic aneurysm, endovascular techniques

Introduction

Hepatic artery aneurysms (HAAs) are the second most common visceral artery aneurysm and representing about 20% of such lesions.¹ Although their incidence is believed to be low, these aneurysms are being encountered with increasing frequency as imaging modalities improve.¹⁻⁴ Presentations are highly variable, but rupture represents the initial presentation in a significant fraction of patients.^{1,3}

Treatments have also evolved substantially since the first case reports in the early 20th century. Today, traditional surgery remains an option, but advances in endovascular and percutaneous technologies have increased the tools available to the surgeon and the pool of patients whose lesions are suitable for intervention. The case presented highlights the techniques available and the importance of a thorough knowledge of each of them.

Case Report

A 65-year-old female presented to our institution with complaints of 6 hours of vague epigastric pain. She was hemodynamically stable with no other complaints. Her examination at that time was unremarkable. The only past medical history was a laparoscopic cholecystectomy 2 years prior to this admission. Basic laboratory tests revealed a leukocytosis of 15.4 thousands per cubic millimeter (k/mm³) and hemoglobin of 12.7 grams per deciliter (g/dL).

The patient was admitted to the general medical service and managed conservatively. Approximately 24 hours after admission, she was found unresponsive to all but painful stimuli, noted to have weak peripheral pulses and significant hypotension. She

responded to a fluid challenge and was quickly intubated, sedated, and transferred to the intensive care unit. Laboratory results at that time revealed a hemoglobin of 7.4 grams per deciliter (g/dL). The patient further stabilized following rapid transfusion of 5 units of packed red blood cells. Urgent computed tomography scan of the abdomen revealed diffuse hemoperitoneum and a 5 × 3.5 cm pseudoaneurysm in the region of the portal vein (Figure 1).

The vascular surgery service was consulted for management and the patient was taken for angiography. Selective superior mesenteric artery angiography revealed a replaced right hepatic artery. Celiac artery catheterization demonstrated an area of contrast blush consistent with a ruptured aneurysm within an intrahepatic branch of the left hepatic artery (Figure 2). Cannulation and embolization of the branch were unsuccessful. During the procedure, the patient's abdomen became tense and peak airway pressures rose. In the face of these findings, endovascular management was aborted and laparotomy was performed.

Approximately 8 L of blood were evacuated on entry into the abdomen. An obvious area of disrupted liver parenchyma with active bleeding was noted within segment 3. The bleeding was temporized via Pringle maneuver and a formal left hepatectomy was performed.

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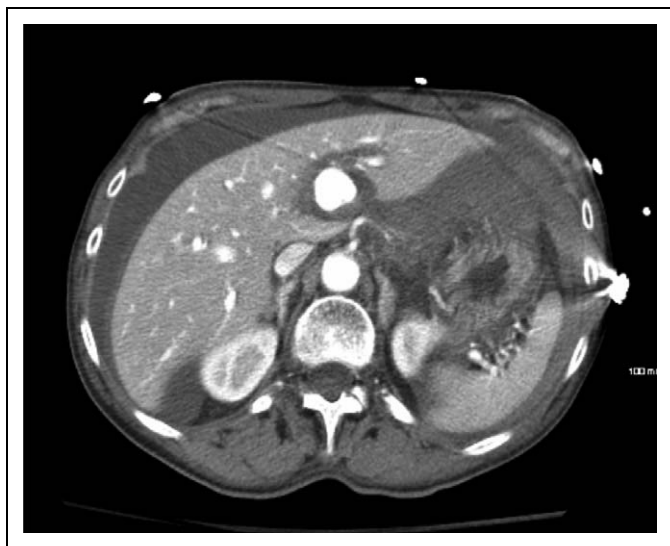


Figure 1. Computed tomography (CT) image demonstrating a large intrahepatic aneurysm.

The patient was hemodynamically stable at the end of the procedure and was taken to the intensive care unit for postoperative monitoring. She was extubated on postoperative day 2 and transferred to a general medical floor on day 3. Her postoperative course was uncomplicated. On postoperative day 7, she was discharged to an inpatient rehabilitation facility from which she has since been discharged.

Discussion

The first report of a ruptured HAA was by Wilson in 1809, following the postmortem dissection of a clergyman. In this seminal report, he described the aneurysm as having “the color, shape, and size of the heart.”^{1,2} In the ensuing 200 years, approximately 3000 cases of HAA have been reported.³ Hepatic artery aneurysm is the second most frequently encountered visceral aneurysm following those of the splenic artery. Hepatic artery aneurysms represent about 20% of visceral artery aneurysms.^{1,3-5} The true incidence of HAA is not known, but it is estimated to be between 0.002% and 0.4%. Both symptomatic and asymptomatic aneurysms are encountered with increasing frequency.^{1,4} The observed increase in incidence is likely secondary to evolutions in surgical technique and an increasing sophistication of imaging modalities.^{2,3}

In the early part of the 20th century, most HAA were mycotic in origin with bacterial endocarditis as a frequent cause. Such aneurysms are rarely observed today due to the effectiveness of modern antibiotic therapy.^{1,4,5} The etiology of HAA formation is multifactorial. Atherosclerosis and hypertension are the most commonly encountered comorbid conditions. Several other conditions including arterial fibromuscular dysplasia, vasculitis, polyarteritis nodosa, collagen vascular diseases, and septic emboli have been associated with HAA.⁴ Endoscopic, percutaneous, and laparoscopic techniques in biliary surgery have resulted in an increase in iatrogenic-traumatic

HAA formation.^{3,6} Similarly, nonoperative management of blunt abdominal traumatic injuries is believed to contribute to delayed HAA formation.³

Hepatic artery aneurysms typically present between the fifth and seventh decades of life and are approximately twice as common in men as women.^{1,4} Anatomically, approximately 80% of HAA are extrahepatic. Of those, 63% of those originate from the common hepatic artery, 28% from the right hepatic artery, and 5% from the left hepatic artery.^{1,3,4} Intrahepatic aneurysms are observed in only 20% of cases, most frequently involving the right hepatic artery.^{1,3,7} Traumatic pseudoaneurysms account for nearly 50% of intrahepatic aneurysms.⁵ Additional visceral aneurysms are encountered in up to 31% of patients. Other, nonvisceral aneurysms are encountered in 42% of patients with HAA; abdominal aortic aneurysms account for 20% of this total.^{3,4}

Approximately 60% of HAA are symptomatic with the most frequent complaints being epigastric or right upper quadrant pain, followed by gastrointestinal hemorrhage and jaundice.^{1,3} Rupture has been reported as the presenting finding in 21% to 80% of HAA.^{1,3,7} Increased risk of rupture has been observed in patients with HAA of nonatherosclerotic origin and those greater than 2 cm.⁴ Ruptured intrahepatic artery aneurysms generally require some form of intervention as they rarely spontaneously stop bleeding.⁸ Mortality from rupture is 21% to 43%.⁴ When HAAs are identified, intervention is recommended in symptomatic aneurysms, asymptomatic aneurysms >2 cm, and a life expectancy of more than 2 years, those that have demonstrated rapid growth, intrahepatic aneurysms, women of childbearing age, and patients with polyarteritis nodosa or fibromuscular dysplasia.³⁻⁵

The choice of treatment modality depends upon the clinical presentation, location of the aneurysm, associated risk factors, and general status of the patient.^{3,4} Conventional angiography remains the gold standard for precise delineation of visceral anatomy and aneurysm location prior to intervention.¹ Traditional surgical options include ligation, excision, venous, or synthetic grafting and hepatic resection.³ Endovascular options include embolization with coils, gelfoam, polyvinyl alcohol particles, or glue, and stenting across the lesion; these techniques can safely and reliably manage lesions that might otherwise require resection.^{1,7} Endovascular techniques may be difficult due to high flow in cases of fistula formation between the lesion and the right hepatic vein or in the setting of anatomic variants such as median arcuate ligament or celiac stenosis.⁷

Under these conditions, percutaneous transhepatic embolization of intrahepatic aneurysms under sonographic guidance is a useful adjunct to endovascular embolization or in situations where a transcatheter approach is not feasible.⁷ Endovascular and percutaneous techniques can be associated with liver necrosis, abscess, and sepsis and hepatic resection may still be necessary.⁵

Intrahepatic artery aneurysms are rare representing only a small fraction of all visceral artery aneurysms. The natural course of intrahepatic artery aneurysm is toward free rupture



Figure 2. Celiac angiogram demonstrating extravasation from the left hepatic artery (arrow).

carrying with them a high likelihood of morbidity and even mortality. The case presented demonstrates the necessity of general understanding of all the treatment modalities available to the surgeon and the need for individualized decisions based on each patient's particular circumstances.

Declaration of Conflicting Interests

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References

1. Arneson MA, Smith RS. Ruptured hepatic artery aneurysm: case report and review of the literature. *Ann Vasc Surg.* 2005;19(4):540-545.
2. Lumsden AB, Mattar SG, Allen RC, Bacha EA. Hepatic artery aneurysms: the management of 22 patients. *J Surg Res.* 1996;60(2):345-350.
3. Luebke T, Heckenkamp J, Gawenda M, Beckurts KTE, Lackner K, Brunkwall J. Combined endovascular-open surgical procedure in a great hepatic artery aneurysm. *Ann Vasc Surg.* 2007;21(6):807-812.
4. Abbas MA, Fowl RJ, Stone WM, et al. Hepatic artery aneurysm: factors that predict complications. *J Vas Surg.* 2003;38(1):41-45.
5. Dolapci M, Ersoz S, Kama NA. Hepatic artery aneurysm. *Ann Vasc Surg.* 2003;17(2):214-216.
6. Chang CW, Chen MJ, Shih SC, Chang WH, Yang WJ, Chu CH. Hepatic subcapsular hematoma secondary to intrahepatic pseudoaneurysm following cholecystectomy. *Dig Dis Sci.* 2007;52(11):3303-3306.
7. Little AF, Lee WK. Percutaneous and endovascular embolization of ruptured hepatic artery aneurysm. *Cardiovasc Intervent Radiol.* 2002;25(3):208-211.
8. Erskine JM. Ruptured intrahepatic aneurysm. *Arch Surg.* 1973;106(2):219-222.