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Stenting of a hepatic artery pseudoaneurysm rupture secondary to a celiac artery dissection

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ABSTRACT

Hepatic artery (HA) pseudoaneurysm rupture is a rare and potentially lethal pathology. We present the case of a celiac artery dissection complicated by an HA pseudoaneurysm rupture that was treated successfully with endovascular stenting. The patient's postoperative course was uncomplicated, and he was further evaluated for an underlying connective tissue disorder. There is no standard treatment for a ruptured HA pseudoaneurysm, although transarterial embolization is most frequently reported. This report demonstrates that self-expanding stent grafts are effective in the emergent repair of HA pseudoaneurysm rupture. (J Vasc Surg Cases Innov Tech 2024;10:101471.)

Keywords: Endovascular; Hepatic artery; Pseudoaneurysm; Stent; Vasculitis

Hepatic artery (HA) pseudoaneurysms are a rare pathology with a high risk of rupture.[1,2] Common etiologies of HA pseudoaneurysms include blunt trauma,[3] iatrogenic injury,[4,5] and inflammatory conditions.[6] These pseudoaneurysms infrequently are a result of arterial dissection.[7,8] Ruptured HA pseudoaneurysms are often treated by endovascular coiling and embolization but no standard of care has been established.[2] We report a rare case involving a 50-year-old man with a spontaneous celiac artery dissection resulting in a common HA pseudoaneurysm rupture, managed effectively through endovascular stenting. The patient provided written informed consent for the report of his case.

CASE REPORT

A 50-year-old man presented to the emergency department after an unwitnessed fall in his home. He arrived with a systolic blood pressure of 50 mm Hg and was evaluated by the trauma team. His medical history was significant for antiphospholipid syndrome complicated by Budd-Chiari syndrome and splenic vein thrombosis. His surgical history was notable for balloon cavoplasty and subsequent suprahepatic inferior vena cava stenting for which he was receiving chronic therapeutic enoxaparin sodium (Lovenox; Sanofi-Aventis). His chief complaint on presentation was 3 days of vague abdominal pain.

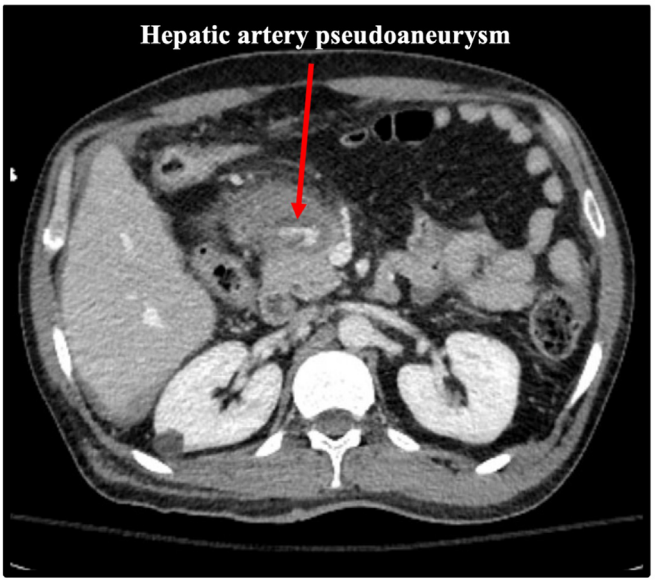

Fig 1. Axial view of celiac trunk dissection and ruptured hepatic artery (HA) pseudoaneurysm.

He received 1 U of packed red blood cells, and fluid resuscitation was initiated. He had a heart rate of 101 bpm and blood pressure of 105/66 mm Hg. His physical examination was notable for abdominal bruising and diffuse tenderness to palpation, with palpable peripheral pulses bilaterally. There was no evidence of fall-associated injuries. His laboratory values were notable for a serum creatinine of 1.20 mg/dL and hematocrit of 32%.

A computed tomography (CT) scan revealed hemoperitoneum, a dissection of the celiac artery with extension into the common HA and splenic artery, a 5.1-cm ruptured common HA pseudoaneurysm, and a 1.4-cm occluded splenic artery pseudoaneurysm (Fig 1). The vascular surgery team was consulted,

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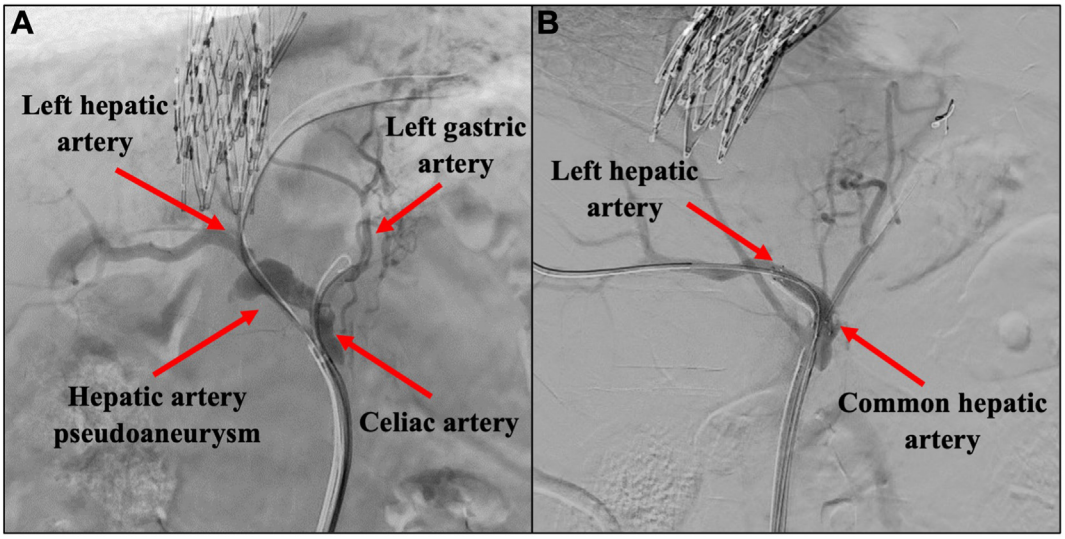

Fig 2. Intraoperative angiogram of ruptured hepatic artery (HA) pseudoaneurysm before (**A**) and after (**B**) endovascular stent placement.

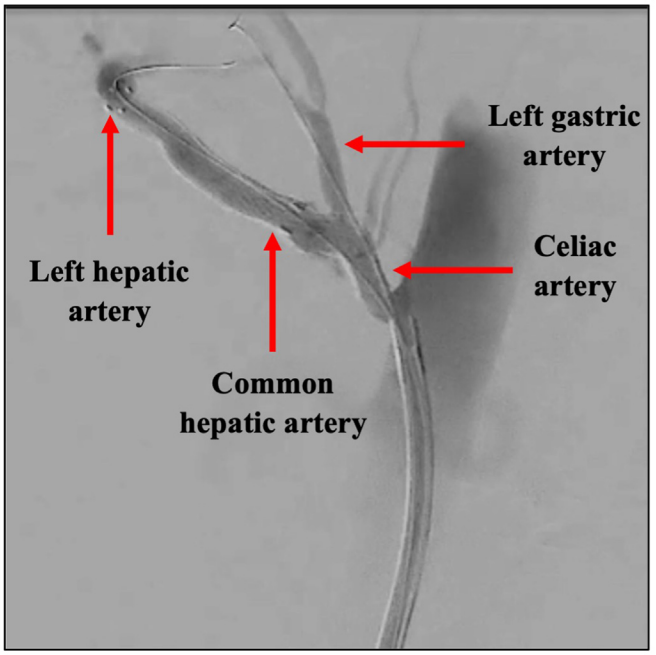

Fig 3. Selective angiogram of celiac artery status after deployment of nitinol stent.

and the patient was emergently transported to the hybrid operating room for multivisceral angiography.

Ultrasound-guided retrograde access was obtained in the right common femoral artery using a standard micropuncture kit. The sheath was upsized to a 7F Flexor Ansel Guiding Sheath (Cook Medical Inc), and a SOS Omni Selective Catheter (AngioDynamics) was used to select the celiac artery and superior mesenteric artery (SMA). Selective angiography of the celiac artery revealed luminal irregularity of the celiac trunk consistent with dissection and a ruptured common HA pseudoaneurysm distally (Fig 2, *A*). The gastric artery and left HA (LHA) were patent; however, the right HA (RHA) was occluded at its origin. The splenic artery pseudoaneurysm noted on CT imaging was also occluded from antegrade flow. We hypothesized these occlusions were secondary to the celiac artery dissection. Selective angiography of the SMA noted no evidence of pathology.

The Ansel sheath was exchanged for an 8.5F Destino steerable sheath (Oscor Inc) for increased stability of our system. The tip of the Oscor sheath was placed at the origin of the celiac artery, and the SOS catheter was used to select the celiac artery. Angiography of the celiac trunk confirmed true lumen access. A Rosen wire guide (Cook Medical Inc) was used to cannulate the left gastric artery, and, using the buddy wire technique, the LHA was instrumented through the pseudoaneurysm.

Because the dissection had effectively excluded the splenic artery, endovascular stenting of both the HA pseudoaneurysm and celiac artery dissection was considered anatomically feasible. A 6 × 50-mm Viabahn endoprosthesis (W.L. Gore & Associates) was deployed with distal and proximal seal zones in the left and common hepatic arteries, respectively (Fig 2, *B*). Selective angiography noted successful exclusion of the pseudoaneurysm without an endoleak. A 9 × 30-mm PRECISE PRO RX nitinol stent (Cordis) was deployed into the celiac artery proximally (Fig 3). Selective angiography of the SMA was performed to assess for retrograde filling of the pseudoaneurysm from the gastroduodenal artery. No retrograde filling of the pseudoaneurysm was seen. A flush aortogram after the case demonstrated flow into the celiac trunk and complete exclusion of the HA pseudoaneurysm.

The patient was admitted to the surgical intensive care unit for monitoring. His postoperative course was uncomplicated, with creatinine and hematocrit improved to 0.6 mg/dL and 37%, respectively, and liver function test results within normal limits. The rheumatology team was consulted for evaluation of vasculitis. Vasculitis-specific laboratory tests were nondiagnostic, and

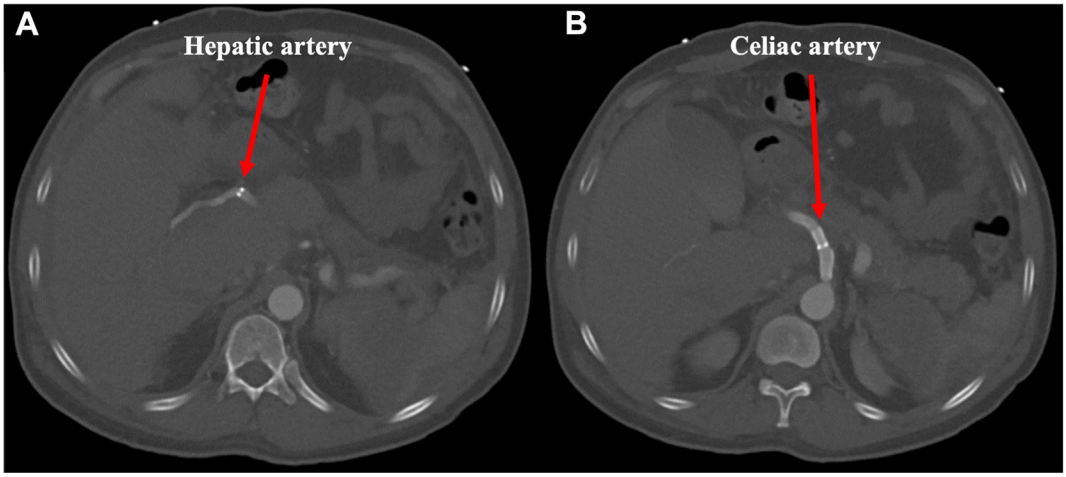

Fig 4. Computed tomography (CT) scan at discharge noting patent hepatic (**A**) and celiac (**B**) artery stents.

the magnetic resonance angiography (MRA) findings were inconclusive due to stent artifacts. The patient is scheduled for a positron emission tomography scan.

The patient was discharged home on postoperative day 4. A CT scan before discharge showed patent stents without an endoleak (Fig 4). He was prescribed dual antiplatelet therapy for 30 days with a transition to anticoagulation and single antiplatelet therapy thereafter. He was scheduled for follow-up with his primary care physician for appropriate asplenic vaccinations. Mesenteric duplex ultrasound imaging at 1 month showed a patent celiac artery.

DISCUSSION

The Society for Vascular Surgery guidelines recommend an endovascular-first approach for all HA pseudoaneurysms if anatomically feasible.[9] Endovascular embolization is the most reported intervention[10,11]; however, targeting the common HA can be complicated by infarction, abscess formation, and pseudoaneurysm recurrence.[2,12] The American Association for Surgery of Trauma recommends open ligation of the injured celiac artery in unstable patients.[13] Ruptured HA pseudoaneurysms are rare, with an incidence of $<0.001\%$.[1] This case demonstrates the efficacy of self-expanding stents to treat visceral pseudoaneurysms in an urgent setting.

Off-label use of stent grafts to treat visceral lesions has been reported and, although technically challenging, can potentially preserve arterial inflow.[2,14] Our patient's pathology was uniquely suited for stenting. Because the RHA was occluded, the pseudoaneurysm could be excluded with a distal seal in the LHA. In the postoperative period, the patient maintained liver function test values within the normal range and did not subsequently develop hepatic sequelae as a result of the RHA occlusion. Because the splenic artery pseudoaneurysm was occluded, the dissection could be stented proximally to the origin of the celiac artery. We used the self-expanding Viahbahn stent to navigate the tortuous visceral vessels. This is a highly flexible and stable system with enhanced trackability beneficial for super-selecting the HA branches.

Visceral aneurysm ruptures can be the presenting sign of polyarteritis nodosa (PAN),[15] a systemic necrotizing vasculitis associated with segmental inflammation of muscular, medium-size arteries in multiple organ systems.[16] In the setting of chronic therapeutic enoxaparin sodium, our patient was at greater risk of bleeding events. PAN is typically idiopathic and diagnosed clinically. Laboratory testing is used to assess organ involvement and exclude competing diagnoses. Biopsy can confirm a suspected diagnosis but noninvasive imaging such as MRA is recommended if this is not feasible. In this case, the placement of an endovascular metal stent made the MRA findings inconclusive. A positron emission tomography scan is a reasonable next step to obtain more diagnostic information about vascular wall involvement in this setting. Once a diagnosis of PAN is confirmed, treatments include high-dose steroids and immunomodulators.

CONCLUSIONS

We report a rare case of a life-threatening celiac artery dissection presenting with concomitant common HA pseudoaneurysm rupture that was successfully managed by endovascular stenting. In patients with appropriate anatomy, stenting is a valuable option for repair of ruptured visceral pseudoaneurysms. Interdisciplinary collaboration is critical to address systemic conditions that might underly visceral vascular disease.

DISCLOSURES

None.

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