

CASE REPORT

A case of a pregnant woman with a special splenic artery aneurysm

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Abstract

Visceral artery aneurysm, especially splenic artery aneurysm, is rare and is usually associated with pregnancy. When such aneurysms rupture, they can be fatal, and they often require emergency surgery. This case report includes a review of the literature and describes a effective multidisciplinary approach to managing this type of aneurysm. We describe the treatment of a ruptured splenic artery aneurysm and the careful coordination of obstetric, vascular surgery, and intensive care teams. The uniqueness of this case arose from the metal embolization coil that was found to have fallen off from a recently embolized ruptured splenic artery aneurysm. The management of this ruptured splenic artery aneurysm and iatrogenic foreign body insult required a combination of multiple specialties to provide life-saving treatment. Such cases should be managed by multidisciplinary teams if institutional resources allow for it.

Keywords: Spleen, Aneurysm, Pregnancy, Rupture

Introduction

Splenic artery aneurysms are rare but life-threatening and are associated with a clear risk of rupture^{1,2}. They are the third commonest type of visceral artery aneurysm, a category that is often associated with conditions involving increased blood flow, such as pregnancy, atrioventricular fistulas, and portal hypertension^{3,4}. Proximal rupture of splenic artery aneurysms appears to be particularly common. Polyarteritis, infective endocarditis, and other inflammatory conditions are also associated with visceral artery aneurysm development. The most common pathophysiological finding associated with visceral aneurysms is generally a defect in the arterial media⁵. These aneurysms usually appear in older patients. In women, the overall incidence of splenic artery aneurysms is less than 0.1%^{6,7}. However, pregnancy is a factor in more than 50% of splenic artery aneurysms afflicting patients younger than 40 years of age^{8,9}. Controversy exists about the optimal timing or size standards for the treatment of these aneurysms. Intravascular techniques have yielded favorable results^{3,10-13}; however, splenic artery aneurysm rupture can be catastrophic^{14,15}.

Case Presentation

A 28-year-old G2P1 woman presented to our emergency department at 33 weeks' gestation with new-onset severe chest and abdominal pain that began 7 hours before her arrival. Her past medical history was unremarkable, and she previously experienced an uncomplicated full-term pregnancy with a natural vaginal delivery. The patient reported weakness, nausea, vomiting, and sweating. In the emergency department, she remained orientated and reactive, but she was drowsy of GCS score 10, Her systolic blood pressure ranged between 50 and 60 mmHg, and her heart rate was 140 beats per minute. She was pale and sweating, and she had diffuse abdominal tenderness. A bedside transabdominal ultrasound examination revealed fetal bradycardia (60 beats per minute). The patient was sent to the operating room for

emergency cesarean delivery.

In the operating room, a cesarean section was performed via Pfannenstiel incision. Upon entry into the peritoneal cavity, 500 mL of blood was evacuated from the abdomen. A live infant in vertex presentation was delivered. The infant was floppy and not crying and, therefore, was immediately handed off to the neonatal intensive care unit team for resuscitation. A general surgery consultation helped to localize the continuous intra-abdominal hemorrhage (with both extensive clotting and active bleeding) to the left upper abdomen. A hematoma infiltrated the splenic and colonic ligaments. The short gastric arteries were taken down with a LigaSure vessel sealing device (Medtronic, USA), the spleen and splenic flexure were both mobilized, and a large 20 cm hematoma around the left kidney and retroperitoneum was visualized with an associated palpable 6-cm pulsating mass.

After the abdomen was filled with gauze, the patient's vital signs temporarily stabilized, and an ABThera temporary abdominal closure system (3M, USA) was placed after she was transfused 6 units of packed red blood cells. The patient was then rushed to the interventional surgery room. With a 2.8 Fr microcatheter, the splenic artery was accessed via the left femoral artery. Angiography revealed a ruptured 6-cm splenic artery aneurysm in the middle of the artery (Figure 1). Multiple interlock coils were used to embolize the aneurysm. Repeat angiography confirmed successful embolization of the aneurysm (Figure 2). The patient gradually became hemodynamically stable over 1 hours, and no further blood transfusions or vasopressors were required for maintenance. After the short gastric arteries were cut off and the splenic artery was embolized, the patient was transferred to the main operating room for re-exploration, splenectomy, and closure. At this time, a metal embolization coil was found protruding from the splenic artery aneurysm sac (Figure 3), and the decision was made to remove the coil to prevent it from migrating into the abdominal cavity.

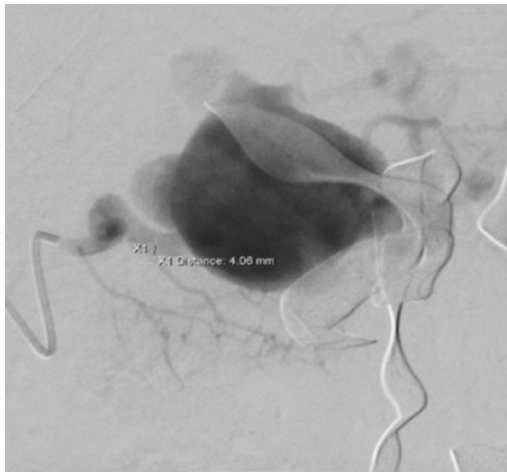


Figure 1. Initial angiogram demonstrating a 6 cm splenic artery aneurysm.

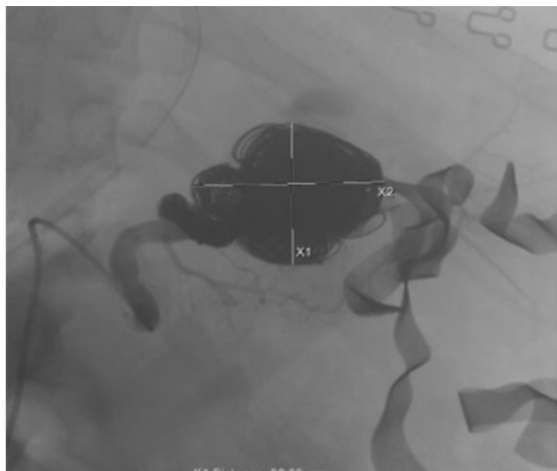


Figure 2. Completed coiling of splenic artery aneurysm along with repeat angiogram

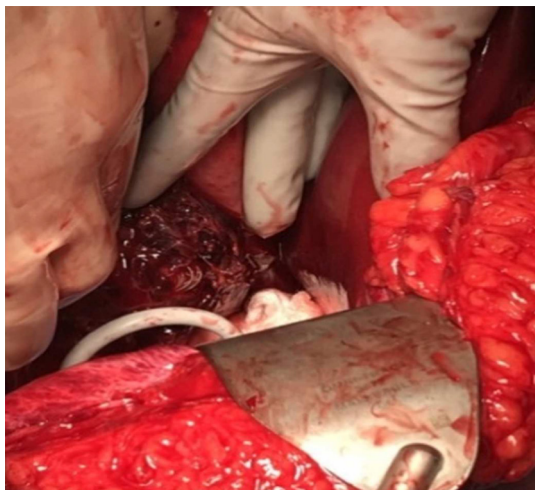


Figure 3. An intraoperative finding of a ruptured splenic artery aneurysm of coil embolization, with coils protruding

The tail of the pancreas was retracted away from the operating field, the splenic blood vessels were ligated about 4 cm from the aneurysm on both sides, and the coil was excised. The abdomen was flushed with warm normal saline and then closed when hemostasis was achieved.

The patient was transferred to the intensive care unit in stable condition. The patient's hemodynamics remained stable during her intensive care unit admission. She was extubated on the second postoperative day and discharged from the hospital on the fifth postoperative day under close observation by her obstetrician and vascular surgeon. Her

child did not survive the initial recovery period. Follow-up computed tomography revealed postoperative changes that are typical after splenectomy, and there was no evidence of pancreatic leakage or other complications.

Discussion

Splenic artery aneurysm is defined as a condition where there is a focal dilation in the diameter of the splenic artery that is 50% greater than the normal vessel diameter. This is the most common visceral artery aneurysm reported making up about 60% to 70% of patients diagnosed with visceral artery aneurysms¹²⁻¹⁵. Splenic artery aneurysm is defined as a condition where there is a focal dilation in the diameter of the splenic artery that is 50% greater than the normal vessel diameter. This is the most common visceral artery aneurysm reported making up about 60% to 70% of patients diagnosed with visceral artery aneurysms. Open surgical intervention is considered the gold standard approach for SAA repair. Techniques involving resection of an aneurysm with interposition bypass are ideal for aneurysms located in the proximal to the mid-splenic artery. Endovascular intervention has gained a lot of popularity recently in managing aneurysms. Techniques vary according to the type of an aneurysm, location, whether preserving the splenic artery will be preserved, and the condition of collaterals. Minimally invasive laparoscopic approach: The laparoscopic approach is a safe therapeutic alternative for cases of elective splenic aneurysm repair. Different techniques have been employed including ligation of the mid-splenic artery via stapling or clipping to splenectomy alone for distal SAAs near the hilum^{8-10,14-15}.

This was a particularly challenging case that required coordination between multiple specialties, including obstetrics and gynecology, neonatology, interventional radiology, general surgery, and vascular surgery. The complexity of this case provides an educational opportunity to inform multidisciplinary care efforts. At present, according to existing literature and guidelines, routine screening for visceral aneurysms is not recommended, and most such aneurysms are incidental imaging findings. Given the rarity of splenic artery aneurysms and the risk associated with ionizing radiation exposure during pregnancy, the introduction of screening for this condition is unlikely⁵. Ultrasonography has not been proven to be reliable for diagnosing pregnant women with splenic artery aneurysms^{16,17}. Operative treatment is recommended for women of childbearing age or pregnant patients with splenic artery aneurysms that are symptomatic or larger than 2.5 cm in diameter, or if a pseudoaneurysm is present⁵.

What should be done for a patient whose aneurysm has ruptured? Is intracavitary therapy appropriate? The choice of surgical treatment for splenic artery aneurysms mainly comes from the surgical literature about trauma and blood vessels. To date, many reports have described the use of splenic artery embolization alone or in combination with surgery as part of a hybrid strategy for hemodynamically stable patients¹⁸⁻²¹. This is still an ongoing research area, and further research is needed, especially with consideration of this kind of obstetric emergency²²⁻²⁴.

For this patient, considering that a 20-cm retroperitoneal hematoma covered the aneurysm itself, a hybrid strategy

was indeed implemented. An attempt was made to dissect the proximal end of the aneurysm, but because of this aneurysm's location, continued dissection might have necessitated distal pancreatectomy. Additionally, when retroperitoneal bleeding is difficult to observe and control, there is a risk of continuous bleeding. Given the patient's favorable response to resuscitation and the subsequent restoration of hemodynamic stability after blood transfusion, the multidisciplinary team's decision was to embolize first. At institutions without interventional radiology, open surgical treatment of ruptured splenic artery aneurysms is the treatment of choice. For all other cases, there is still no consensus in the literature regarding the best treatment for ruptured splenic artery aneurysms in pregnant patients. Compared with open surgery, endovascular embolization is associated with lower perioperative morbidity rates, but it is usually only used for small and unruptured aneurysms.

References

- Hogendoorn W, Lavida A, Hunink MG, et al. Open repair, endovascular repair, and conservative management of true splenic artery aneurysms. *J Vasc Surg.* 2014; 60 (6): 1667-76. e1. doi: 10.1016/j.jvs.2014.08.067
- Dave SP, Reis ED, Hossain A et al. Splenic artery aneurysm in the 1990s. *Ann Vasc Surg.* 2000; 14 (3): 223-229. doi: 10.1007/s100169910039
- Berceli SA. Hepatic and splenic artery aneurysms. *Semin Vasc Surg.* 2005; 18 (4): 196-201. doi: 10.1053/j.semvascsurg.2005.09.005
- Yadav R, Tiwari MK, Mathur RM et al. Unusually giant splenic artery and vein aneurysm with arteriovenous fistula with hypersplenism in a nulliparous woman. *Interact Cardiovasc Thorac Surg.* 2009; 8 (3): 384-6. doi: 10.1510/icvts.2008.196121
- Ferreira RA, Ferreira MC, Ferreira DA et al. Splenic artery aneurysm. *Rev Col Bras Cir.* 2016; 43 (5): 398-400. doi: 10.1590/0100-69912016005005
- Pulli R, Dorigo W, Troisi N et al. Surgical treatment of visceral artery aneurysms: A 25-year experience. *J Vasc Surg.* 2008; 48 (2): 334-42. doi: 10.1016/j.jvs.2008.03.043
- Abbas MA, Stone WM, Fowl RJ et al. Splenic artery aneurysms: two decades experience at Mayo clinic. *Ann Vasc Surg.* 2002; 16 (4): 442-9. doi: 10.1007/s10016-001-0207-4
- McMahon DP, Ward WH, Harwood JL et al. An institutional review of splenic artery aneurysm in childbearing-aged females and splenic artery aneurysm rupture during pregnancy. Is screening justified? *Mil Med.* 2012; 177 (1): 96-8. doi: 10.7205/milmed-d-11-00252
- Desai M, Wali AR, Birk HS et al. Role of pregnancy and female sex steroids on aneurysm formation, growth, and rupture: a systematic review of the literature. *Neurosurg Focus.* 2019; 47 (1): E8. doi: 10.3171/2019.4.FOCUS19228
- Habbal, Y, Christophi et al. Aneurysms of the splenic artery – a review. *Surgeon* 2010; 8: 223–231. doi: 10.1016/j.surge.2009.11.011
- Tessier, DJ, Stone, WM, Fowl, RJ. Clinical features and management of splenic artery aneurysm pseudoaneurysm: case series and cumulative review of literature. *J Vasc Surg* 2003; 38: 969–974. doi: 10.1016/s0741-5214(03)00710-9
- Ouchi T, Kato N, Nakajima K et al. Splenic Artery Aneurysm Treated With Endovascular Stent Grafting: A Case Report and Review of Literature. *Vasc Endovascular Surg.* 2018 Nov; 52 (8): 663-668. doi: 10.1177/1538574418785252
- Lakin RO, Bena JF, Sarac TP, et al. The contemporary management of splenic artery aneurysms. *J Vasc Surg.* 2011; 53 (4): 958-965. doi: 10.1016/j.jvs.2010.10.05
- acobson J, Gorbatkin C, Good S et al. Splenic artery aneurysm rupture in pregnancy. *Am J Emerg Med.* 2017;35(6):935.e5-935.e8. doi: 10.1016/j.ajem.2016.12.035
- Wiener Y, Tomashev R, Neeman O, et al. Splenic artery aneurysms during pregnancy: An obstetric nightmare. *Eur J Obstet Gynecol Reprod Biol.* 2019; 237: 121-125. doi: 10.1016/j.ejogrb.2019.04.029
- Durkin N, Deganello A, Sellars ME et al. Post-traumatic liver and splenic pseudoaneurysms in children: Diagnosis, management, and follow-up screening using contrast enhanced ultrasound (CEUS). *J Pediatr Surg.* 2016; 51 (2): 289-292. doi: 10.1016/j.jpedsurg.2015.10.074
- Cai DM, Parajuly SS, Ling WW et al. Diagnostic value of contrast enhanced ultrasound for splenic artery complications following acute pancreatitis. *World J Gastroenterol.* 2014; 20 (4): 1088-1094. doi: 10.3748/wjg.v20.i4.1088
- Bessoud B, Duchosal MA, Siegrist CA et al. Proximal splenic artery embolization for blunt splenic injury: clinical, immunologic, and ultrasound-Doppler follow-up. *J Trauma* 2007; 62: 1481–1486. doi: 10.1097/TA.0b013e318047dfb8
- Haan JM, Biffi W, Knudson MM, et al. Splenic embolization revisited: a multicenter review. *J Trauma* 2004; 56: 542–547. doi: 10.1097/01.ta.0000114069.73054.45
- Haan JM, Bochicchio GV, Kramer N, et al. Non-operative management of blunt splenic injury: a 5-year experience. *J Trauma* 2005; 58: 492–498. doi:10.1097/01.ta.0000154575.49388.74
- Igarashi Y, Ohki T, Maeda K et al. Hybrid Surgery for Multiple Visceral Artery Aneurysms: A Case Report. *Ann Vasc Surg.* 2019; 60: 478. e19-.e24. doi: 10.1016/j.avsg.2019.03.010
- Ahuja C, Farsad K, Chadha M. An Overview of Splenic Embolization. *AJR Am J Roentgenol.* 2015; 205 (4): 720-725. doi: 10.2214/AJR.15.14637
- Ballout RA, Ghanem R, Nassar A et al. Splenic Artery Aneurysm (SAA) Rupture in Pregnancy: A Case Report of a Rare but Life-Threatening Obstetrical Complication. *J Womens Health Dev.* 2019; 2 (1): 19-27. doi: 10.26502/fjwhd.2644-2884004
- Kashiura M, Yada N, Yamakawa K. Interventional radiology versus operative management for splenic injuries: a study protocol for a systematic review and meta-analysis. *BMJ Open.* 2019; 9 (8): e028172. doi: 10.1136/bmjopen-2018-028172
- Björck M, Koelemay M, Acosta S, et al. Editor's Choice Management of the Diseases of Mesenteric Arteries and Veins: Clinical Practice Guidelines of the European Society of Vascular Surgery (ESVS). *Eur J Vasc Endovasc Surg.* 2017; 53 (4): 460-510. doi: 10.1016/j.ejvs.2017.01.010
- Cordova AC, Sumpio BE. Visceral Artery Aneurysms and Pseudoaneurysms—Should They All be Managed by Endovascular Techniques?. *Ann Vasc Dis.* 2013; 6 (4): 687-693. doi: 10.3400/avd.ra.13-00045
- Martinelli O, Giglio A, Irace L et al. Single-Center Experience in the Treatment of Visceral Artery Aneurysms. *Ann Vasc Surg.* 2019; 60: 447-454. doi: 10.1016/j.avsg.2019.01.010