Endovascular coil embolization for a giant anomalous splenic artery aneurysm

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Splenic arteries arising from superior mesenteric arteries, also known as splenomesenteric trunks, are uncommon entities. Aneurysms in relation to these variant splenic arteries are even rarer. Open surgery, laparoscopic technique, or endovascular management could be chosen. We report a patient with an anomalous splenic arteries aneurysm that was excluded with coil embolization in a minimally invasive endovascular way. A follow-up contrast-enhanced computed tomography angiogram performed 1 year after the procedure showed total exclusion of the aneurysm sac, patency of the superior mesenteric artery, and the patient was in good condition. (J Vasc Surg Cases 2015;1:141-3.)

The splenic artery (SA) arising from the superior mesenteric artery (SMA) is an uncommon anatomical variant that is seen in <1% of the population.[1] Aneurysms in relation to these variant SAs are even rarer, with limited cases reported.[2-4] Considering the inherent risk of rupture, which may cause disastrous consequence, the anomalous SA aneurysm (SAA) should be treated properly. Preprocedural planning and selection of optimal tools are of the utmost importance. We report the successful endovascular treatment of an anomalous SAA using coils embolization in an 88-year-old patient. Written consent to publish was obtained from the patient.

CASE REPORT

An 88-year-old man with a chief compliant of abdominal discomfort was admitted to our vascular center. He denied any history of abdominal surgery, trauma, or portal hypertension. Concurrent comorbidities included chronic cardiac dysfunction, chronic obstructive pulmonary disease, and hypertension. Physical examination showed a pulsatile mass on the abdomen. A contrast-enhanced computed tomography angiogram (CTA) demonstrated a 44.2-mm × 40.4-mm aneurysm arising close to the origin of the SA, which originated from the proximal SMA (Fig 1). Considering his age, the concurrent risk factors, and the anatomical variation of this patient, a less-invasive endovascular repair was planned.

Under local anesthesia, right common femoral artery access was obtained. After administration of 3000 IU of heparin, a 4F pigtail catheter was introduced for an angiogram, which confirmed the giant SAA arising from the SMA. Then, selective catheterization of the SMA was performed with a 4F Cobra catheter (Cordis/Johnson & Johnson, Miami, Fla) via a 0.035-inch hydrophilic Terumo wire (Terumo Medical Corp, Somerset, NJ). A 7 F, 45-cm guiding catheter was placed into the splenomesenteric trunk. The distal SA was catheterized selectively with the 4F Cobra catheter over the 0.035-inch hydrophilic Terumo wire. Two 0.015-inch, 5-cm-long stainless steel coils (Cook Inc, Bloomington, Ind) forming loops with an 8-mm diameter were placed into the outflow vessel. Then, the Cobra catheter was retracted into the sac of the aneurysm in which six 0.035-inch, 5-cm-long stainless coils (Cook Inc) with a 12-mm diameter were deployed. Because of the extremely short proximal part, no coil was implanted in the inflow vessel of the SAA. A completion angiogram showed total exclusion of this anomalous SAA, with no endoleak.

This patient underwent a smooth recovery, without access site complications, and was discharged 3 days postoperatively. He had no fever, and inflammatory markers were within normal reference ranges at the 1-year follow-up. Contrast-enhanced CTA confirmed the occluded aneurysm sac with its size reduced to ~30 mm × 30 mm (Fig 2, *A*). Meanwhile, patency of the SMA was confirmed (Fig 2, *B*), and no evidence of splenic infarction was noted (Fig 2, *A*).

DISCUSSION

SAAs are the most frequently observed visceral artery aneurysms, accounting for ~70% of all visceral artery aneurysms.[5] However, aneurysms of the SA with an anomalous origin from the SMA are extremely rare. Most SAAs are associated with degeneration of the elastic fibers and loss of smooth muscle in the media.[6] The strong association of the SAA with the female gender and pregnancy has been reported, which is likely related to hormonal effects.[7] The main complication of SAAs is rupture, and mortality rates vary considerably, from 20% to 36%.[5,8] Therefore, according to the indications for intervention of visceral artery aneurysms, symptomatic aneurysms, aneurysms in women of child-bearing age, and asymptomatic aneurysms sized >2 cm in good-risk surgical candidates should receive treatment.[9]

Interestingly, most of these anomalous SAAs have been seen in the proximal location close to the origin of the

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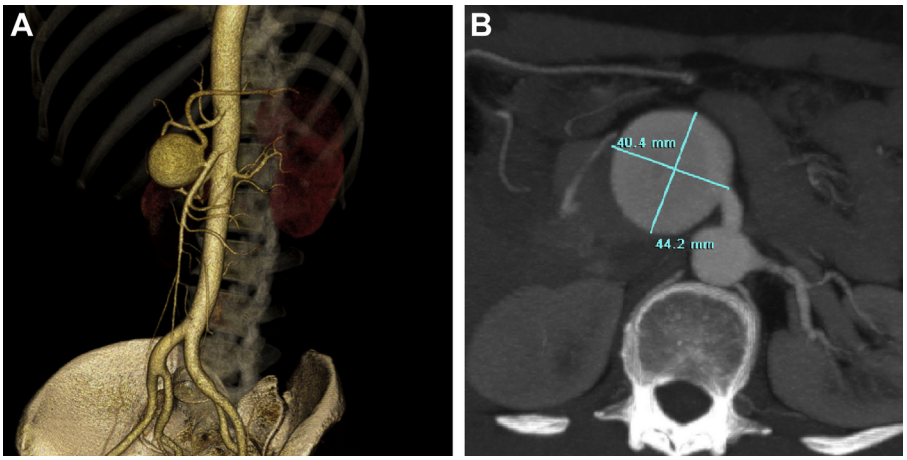

Fig 1. A, A three-dimensional reconstruction shows the giant anomalous splenic artery (SA) aneurysm (SAA) arising from the superior mesenteric artery (SMA). **B,** A transverse computed tomography angiogram (CTA) image manifests the size of the anomalous SAA.

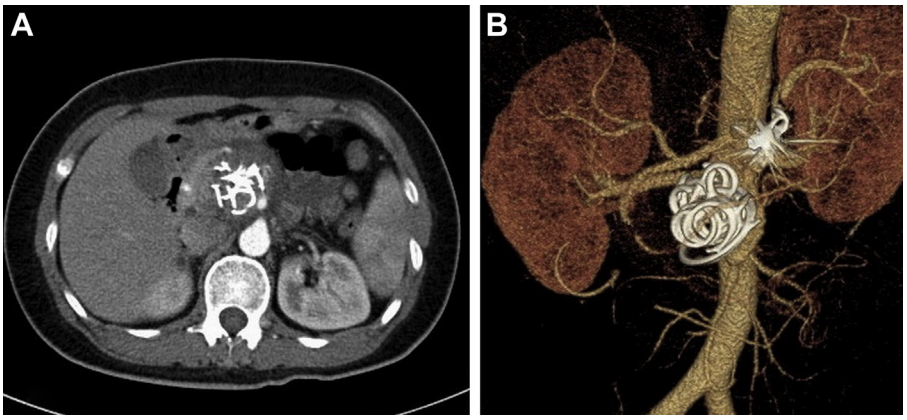

Fig 2. A, A computed tomography angiogram (CTA) 1 year postoperatively confirms occlusion of the anomalous splenic artery (SA) aneurysm (SAA). Coils are visible in the outflow vessel and in the aneurysm sac. **B,** A three-dimensional reconstruction transverse image of the CTA shows expected sac shrinkage and no evidence of splenic infarction.

SA.[10] This contrasts with the usually described position of SAAs, which are generally located in the middle or the distal SA, making management of these SAAs more challenging. Methods of treatment include traditional open surgery, laparoscopic techniques, and minimally invasive endovascular therapy. A traditional operation can be complicated by serious underlying comorbidities and can lead to a 1% to 3% mortality rate together with a 9% to 25% perioperative complication rate from splenic or pancreatic injury.[5,11,12]

The laparoscopic technique is not a commonly performed procedure even for normal SAA. Mastracci et al[13] presented their experience with two patients treated with a combination of coil embolization and laparoscopic occlusion of the SA achieved by developing a retropancreatic plane and applying clips immediately distal to the aneurysm. This method offers an alternative to endovascular and open surgical management. Patients are spared the need for yearly CTA follow-up to evaluate for aneurysm reperfusion, which is required for endovascular treatment.[14]

Compared with traditional open surgery and laparoscopic techniques, the minimally invasive endovascular technique has a lower morbidity and mortality rate. With the technologic development in minimally invasive interventional therapies, management options for anomalous SAAs have been expanded, which always consist of exclusion of the aneurysm sac with embolic agents (coil, thrombin, gelfoam, glue, particle polyvinyl alcohol)[15] or placement of bare stents or stent grafts. For wide-necked anomalous SAAs, deployment of a bare stent or a stent graft has been the most frequently used technique, which not only maintains vessel patency and end-organ perfusion but also prevents coil migration into the SMA. Excessive tortuosity of the artery can complicate stent placement and deployment. Neither bare stents nor stent grafts were

used in our patient because the proximal neck of this anomalous SAA was narrow, which prevented coils migration outside of the sac.

Main complications of SAA coil embolization include splenic infarction, postembolization syndrome, and aneurysm sac reperfusion.[16] Generally speaking, other vessels, such as the short gastric arteries or the gastroepiploic arteries, will invariably feed the spleen and keep it alive. However, insufficient flow to the spleen can sometimes lead to partial infarction and occasional development of splenic abscess. Most of these patients are asymptomatic and can be managed nonsurgically.

Postembolization syndrome is one of the most common complications that has the potential to lead to prolonged hospitalization. It typically includes fever, abdominal pain, pleural effusion, and possibly also a transient increase of pancreatic enzyme levels.[17] It did not correlate with splenic infarction.

Conversely, some patients who were completely asymptomatic had evidence of splenic infarction during postoperative CTA scanning.[11] Aneurysm sac reperfusion can lead to higher intrasac pressure, increasing the risk of rupture. It can be treated by repeat embolization using additional coils, avoiding the need for surgery. In general, yearly follow-up by CTA scanning is necessary in patients who receive endovascular treatment to evaluate for leak and subsequent growth.

CONCLUSIONS

Endovascular treatment is a safe, effective, minimally invasive therapeutic option for anomalous SAAs, allowing patients considered medically unfit for traditional surgical repair to be treated. The choice of the most suitable materials depends on the anatomical characteristics of these aneurysms. However, further studies are needed to determine the long-term clinical efficacy and applicability of this technique.

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