Case Report | Intervention

http://dx.doi.org/10.3348/kjr.2013.14.6.931
pISSN 1229-6929 · eISSN 2005-8330
Korean J Radiol 2013;14(6):931-934

Korean Journal of Radiology
KJR

Endovascular Treatment of Aneurysm of Splenic Artery Arising from Splenomesentric Trunk Using Stent Graft

Chinmay Bhimaji Kulkarni, MD, Srikanth Moorthy, MD, Sreekumar Karumathil Pullara, MD, Rajesh Ramaih Kannan, MD

All authors: Department of Radiology, Amrita Institute of Medical Sciences, Amrita Lane, Ponekkara, Cochin, Kerala State 682041, India

We report a rare case of aneurysm of splenic artery arising anomalously from the superior mesenteric artery (SMA). The aneurysm was treated successfully by coil embolization of the splenic artery distal to aneurysm and then deploying a stent graft in the SMA. A combination of stent graft and coil embolization for the treatment of aberrant splenic artery aneurysm has been reported only once. We describe the imaging findings and the endovascular procedure in this patient.
Index terms: *Aberrant splenic artery; Aneurysm; Stent graft*

INTRODUCTION

Splenic artery aneurysms are the most common visceral artery aneurysms (1). Aberrant origin of splenic artery from the superior mesenteric artery (SMA) is rare. Aneurysms of an aberrant splenic artery are very uncommon with only 25 cases reported in literature (2). The retropancreatic location of these aneurysms renders their treatment more challenging to vascular surgeons. We describe the imaging findings and the endovascular treatment of a patient with an aberrant splenic artery aneurysm using a combination of stent graft and coil embolization.

Received September 20, 2012; accepted after revision October 17, 2012.
Corresponding author: Chinmay Bhimaji Kulkarni, MD, Department of Radiology, Amrita Institute of Medical Sciences and Research Center, Amrita Lane, Ponekkra, Elamakkara P.O., Kochi, Kerala 682041, India.
• Tel: (91) 9946845428 • Fax: (91) 0484-2802020
• E-mail: drchinmaykulkarni@gmail.com

CASE REPORT

A 35-year-old man presented with recurrent upper abdominal pain. Physical examination and laboratory investigations did not reveal any abnormality. Abdominal ultrasound showed an aneurysm arising from the splenic artery. CT angiography revealed a 2.2 cm saccular aneurysm arising from splenic artery close to its anomalous origin from the SMA. The aneurysm was located posterior to the body of pancreas (Fig. 1A, B). The CT angiography showed that the splenic artery was the first branch of SMA and there was only a 5 mm distance between the ostium of splenic artery and the aneurysm. The next branch from the SMA was the first jejunal branch, 1 cm distal to the splenic artery ostium. The proximal SMA measured 7 mm and the distal splenic artery 6 mm in diameter. An endovascular therapy was planned. It was decided to 'trap' the aneurysm by occluding the splenic artery distal to the aneurysm with coils and placing a stent graft in the SMA to block the inflow into the aneurysm. Under conscious sedation and local anesthesia the left axillary artery was punctured and a 45 cm long 8 Fr sheath (Flexor, Cook, Bloomington, IN, USA) was placed into the upper abdominal aorta. In

addition, a pigtail catheter was introduced from a right femoral route and placed at the level of SMA ostium to enable angiography prior to stent deployment. A 4 Fr vertebral Glide catheter and 0.35" hydrophilic wire (Terumo, Tokyo, Japan) combination was used to engage the splenic ostium and the catheter was negotiated through the aneurysm into the normal segment just distal to aneurysm. Four 0.38" steel coils (Tornado, Cook, Bloomington, IN, USA) with diameters ranging from 7 mm to 4 mm were delivered through the catheter to occlude the splenic artery

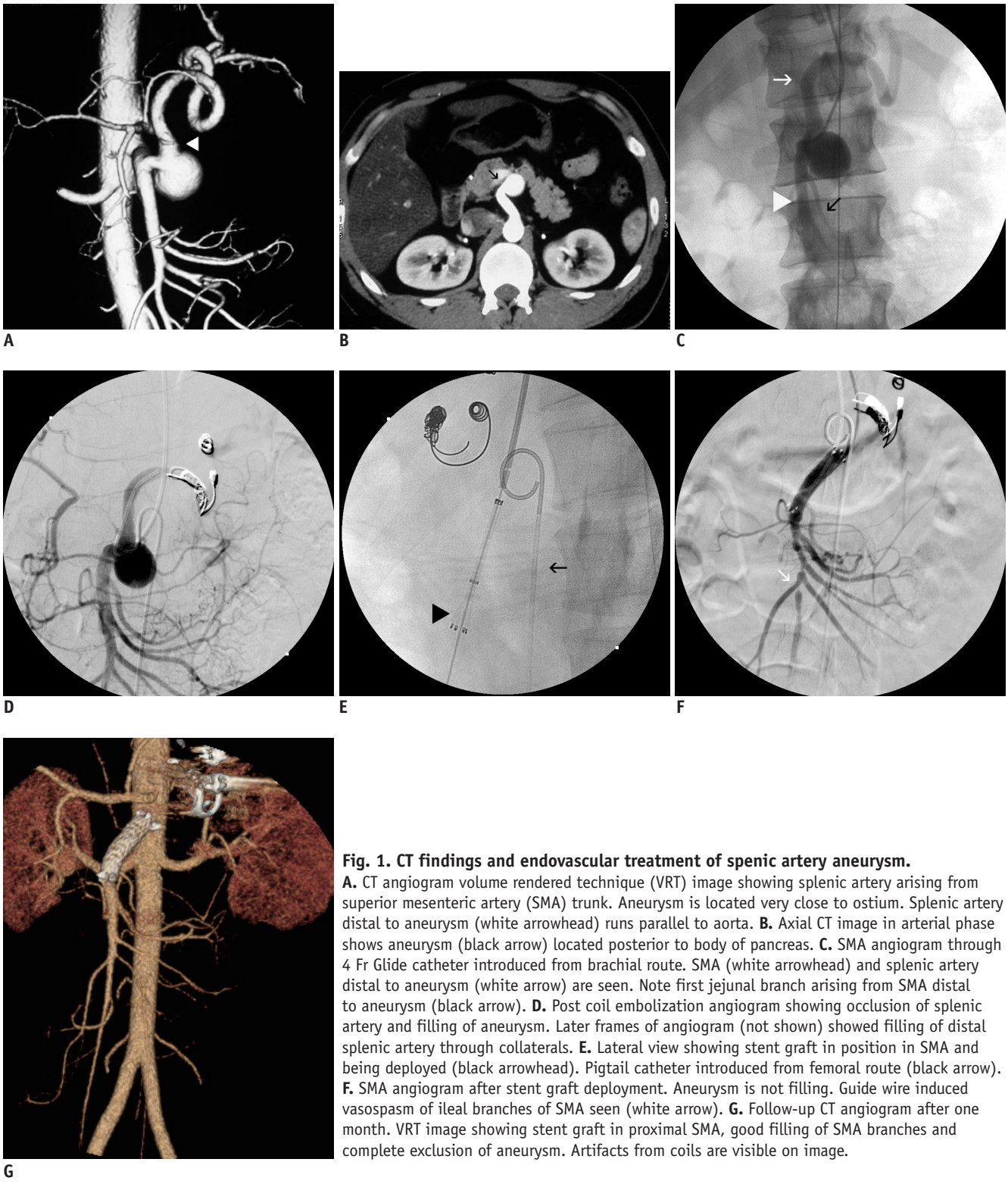

Fig. 1. CT findings and endovascular treatment of spenic artery aneurysm.
A. CT angiogram volume rendered technique (VRT) image showing splenic artery arising from superior mesenteric artery (SMA) trunk. Aneurysm is located very close to ostium. Splenic artery distal to aneurysm (white arrowhead) runs parallel to aorta. **B.** Axial CT image in arterial phase shows aneurysm (black arrow) located posterior to body of pancreas. **C.** SMA angiogram through 4 Fr Glide catheter introduced from brachial route. SMA (white arrowhead) and splenic artery distal to aneurysm (white arrow) are seen. Note first jejunal branch arising from SMA distal to aneurysm (black arrow). **D.** Post coil embolization angiogram showing occlusion of splenic artery and filling of aneurysm. Later frames of angiogram (not shown) showed filling of distal splenic artery through collaterals. **E.** Lateral view showing stent graft in position in SMA and being deployed (black arrowhead). Pigtail catheter introduced from femoral route (black arrow). **F.** SMA angiogram after stent graft deployment. Aneurysm is not filling. Guide wire induced vasospasm of ileal branches of SMA seen (white arrow). **G.** Follow-up CT angiogram after one month. VRT image showing stent graft in proximal SMA, good filling of SMA branches and complete exclusion of aneurysm. Artifacts from coils are visible on image.

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(Fig. 1C-E). The catheter was then withdrawn into the SMA and exchanged for a stiff Amplatz wire. An 8 mm x 4 cm Fluency Plus stent graft (Bard, Tempe, Arizona, USA) was negotiated over the wire and deployed with its proximal end at the SMA ostium and distal end just short of the first jejunal branch. Angiography showed complete exclusion of aneurysm and good filling of all SMA branches (Fig. 1F, G). Distal splenic artery was seen reforming through left gastric and right gastroepiploic collaterals. The patient made an uneventful recovery and was discharged on the third day after procedure. There were no splenic infarcts. Follow-up CT scans at one month and three years showed patent SMA and complete thrombosis of the aneurysm. There were no splenic infarcts.

DISCUSSION

A celiac trunk with normal branching into splenic, hepatic and left gastric arteries is seen in about 85% of individuals. Hepatomesenteric (replaced hepatic artery) and celiacomesenteric (common celiac axis and superior mesenteric) trunks are frequent variations. A splenomesenteric trunk (replaced splenic artery from SMA) is rare and is estimated to occur in less than 1% of individuals (1, 3). Visceral artery aneurysms have been reported to occur in 0.2% of the general population (4). Splenic artery aneurysms are the commonest visceral aneurysms and account for up to 70% of all visceral aneurysms in some series (5). They are most commonly found in patients with cirrhosis and portal hypertension. Other etiologies include pregnancy, essential hypertension, atherosclerosis, arteritis, pancreatitis and trauma. No definite cause was evident in our patient. We presume that a congenital weakening of the wall of the anomalous vessel led to the aneurysm.

Visceral aneurysms carry a high risk of rupture and mortality in the event of rupture is reported to range from 35% to 100% (6, 7). Size more than 2 centimeters, rapid increase in size and concurrent pregnancy are considered to be risk factors for rupture and hence indications for treatment of splenic artery aneurysms (5). In our patient, the size of 2.2 cm and recurrent abdominal pain provided the rationale for treatment. Splenic artery aneurysm arising from an anomalous splenic artery is very rare. Only twenty five cases have been reported so far. All except one patient were treated with open surgery or a combination of endovascular coiling and laparoscopy (2). Sato et al. (3) successfully used an intra-aneurysmal coil packing for treating a similar aneurysm. Various endovascular techniques are used for management of aneurysms (8). 'Trapping' the aneurysm by occluding the vessel proximal and distal to the lesion is the simplest method of treating splanchnic aneurysms. In our patient, due to the location of the aneurysm close to the ostium of the vessel, safe coiling of the artery proximal to the aneurysm was not possible. Use of Amplatzer vascular plug and N-butyl cyanoacrylate glue injection for splenic aneurysms have also been reported (9, 10). Filling the aneurysm with coils to induce thrombosis is another well established technique that is useful when the parent vessel has to be preserved and the aneurysm involves only part of the circumference of the vessel. In our patient the aneurysm involved the entire circumference of the vessel and filling the aneurysm with coils would have certainly resulted in occlusion of the vessel. Moreover the technique is time-consuming and prolapse of coils into SMA was a potential risk we wanted to avoid. Treatment of a celiac axis trunk aneurysm with stent graft has been reported (11). Using a stent graft allowed us to block the inflow into the aneurysm while maintaining flow in the SMA. Given the complex anatomy, employing the stent graft simplified the procedure considerably and fluoroscopy time could be reduced. Stent grafts are polytetrafluroethyelene covered self expandable metallic stents that are used to exclude aneurysms from the circulation while maintaining patency of the parent vessel. In the SMA, stent graft deployment carries the potential risk of occluding vital branches supplying the bowel. CT angiography clearly depicted the anomaly and provided all of the vascular anatomical details and measurements to plan the procedure. The stent graft delivery system is very stiff and a brachial approach was required to get a favorable angle of entry into the SMA. Though stent grafts are approved for use and are being used widely, their long term patency and structural integrity have not been established. They should probably be used in young patients with long life expectancy only if other modes of therapy are not feasible or carry greater risk (12).

Our case shows that stent grafts can be very useful in the management of aneurysms in the splanchnic circulation with complex anatomy.

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