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CLINICAL CASE REPORT

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Endovascular Treatment of Splenic Artery Aneurysm With a Stent-Graft

A Case Report

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Abstract: Splenic artery aneurysm, one of the most common visceral aneurysms, accounts for 60% of all visceral aneurysm cases. Open surgery is the traditional treatment for splenic artery aneurysm but has the disadvantages of serious surgical injuries, a high risk of complications, and a high mortality rate.

We report a case who was presented with splenic artery aneurysm. A 54-year-old woman complained of upper left abdominal pain for 6 months. An enhanced computed tomography scan of the upper abdomen indicated the presence of splenic artery aneurysm. The splenic artery aneurysm was located under digital subtraction angiography and a 6/60 mm stent graft was delivered and released to cover the aneurysm. An enhanced computed tomography scan showed that the splenic artery aneurysm remained well separated, the stent graft shape was normal, and the blood flow was unobstructed after 1 year.

This case indicates a satisfactory efficacy proving the minimal invasiveness of stent graft exclusion treatment for splenic artery aneurysm.

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Abbreviations: CT = computed tomography, DSA = Digital Subtraction Angiography, SAA = Splenic artery aneurysm.

INTRODUCTION

Splenic artery aneurysm (SAA), one of the most common visceral aneurysms, accounts for 60% of all visceral aneurysm cases. The mortality rate of ruptured SAA is as high as 10% to 25%.[1–3] Open surgery is the traditional treatment for SAA but has the disadvantages of serious surgical injuries, a high risk of complications, and a high mortality rate.[3,4] In recent years, with the rapid development of interventional therapies, increasing reports of interventional therapy for SAA with improving efficacy are available. Here, we describe successfully treating 1 case of SAA with an endovascular stent graft delivered via the splenic artery.

CASE REPORT AND TECHNIQUE DESCRIPTION

Our 54-year-old female patient was admitted to the hospital with a 6-month history of upper left abdominal pain accompanied by intermittent abdominal distention. She had a 30-year history of hypertension and was on regular medication. A physical examination revealed a soft abdomen with deep tenderness in the upper left abdomen and no rebound tenderness or muscle tension, no abdominal mass, a nonpalpable liver and spleen, no percussion pain in the waist or back, and no shifting dullness. Vascular sounds could be heard in the upper left abdominal quadrant and the bowel sounds were normal.

An enhanced computed tomography (CT) scan of the upper abdomen indicated the presence of SAA (Figure 1). Routine blood examination, erythrocyte sedimentation rate, and liver and kidney function findings were normal. On the 3rd day of admission, a splenic artery angiogram was performed under local anesthesia. Celiac artery and right hepatic artery angiography showed thickening of the middle segment of the main trunk of the splenic artery.

A cobra catheter (Radiofocus, Terumo, Tokyo, Japan) was then advanced into the opening of the splenic artery, and angiography showed a locally enlarged middle segment of its main trunk with a largest diameter of approximately 2.8 cm consistent with the presentation of SAA (Figure 2A). A guidewire was delivered into the distal end of the splenic artery, and an 8F guiding multipurpose catheter was placed over the

FIGURE 1. Preoperative computed tomographic (CT) image shows a splenic artery aneurysm (arrow).

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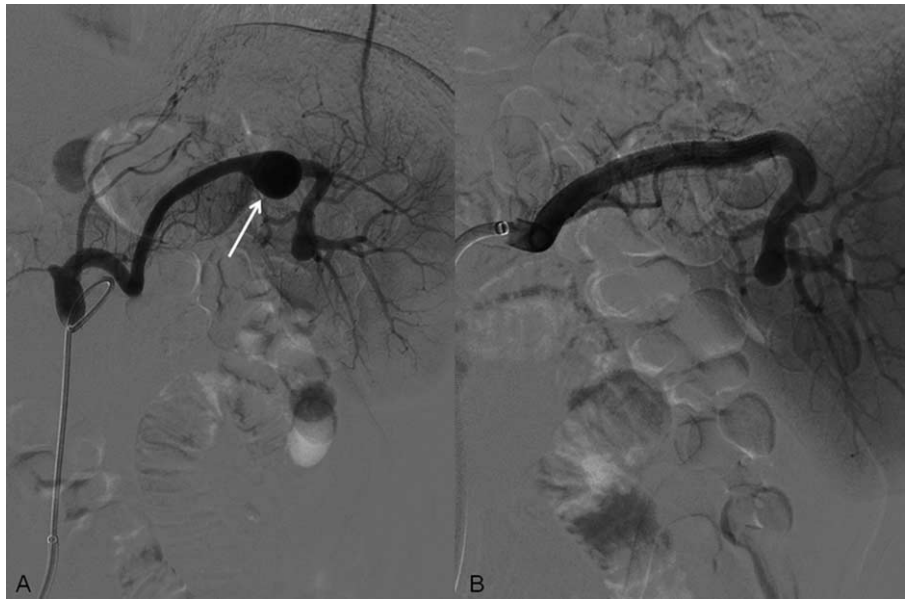

FIGURE 2. (A) Digital subtraction angiogram demonstrates a splenic artery aneurysm (arrow). (B) Following interventional procedure: control angiogram show exclusion of aneurysm by the stent-graft.

guidewire. Next, a super-stiff guidewire replaced the catheter. The SAA was located under digital subtraction angiography (DSA) roadmap guidance, and a 6/60 mm stent graft (Fluency; Bard Incorporated, Karlsruhe, Germany) was delivered and released to cover the aneurysm.

Repeated angiography confirmed good stent graft location and shape; no obvious aneurysm could be visualized, and the distal portion of the spleen was visible (Figure 2B). After removal of the arterial sheath, the puncture site of the right femoral artery was sealed by a vascular closure device (Angio-Seal; St Jude Medical, St Paul, Minnesota). During the procedure, heparin 2000 IU was administered intravenously. The patient experienced no postoperative discomfort. After the procedure, the patient received a subcutaneous injection of low molecular weight heparin calcium 4000 U twice daily for 3 days, 100 mg oral aspirin once daily, and 75 mg oral clopidogrel hydrogen once daily for prophylaxis.

After the procedure, the patient's abdominal symptoms disappeared. No vascular sounds could be heard. A follow-up enhanced CT scan of the upper abdomen showed good stent graft location and shape and no evident infarctions in the spleen after 1 week (Figure 3A). A follow-up examination found no serious complications after 1 month. An enhanced CT scan showed that the SAA remained well separated, the stent graft shape was normal, and the blood flow was unobstructed after 1 year (Figure 3B).

DISCUSSION

SAA is the most common visceral aneurysm, but its cause is not completely clear. The known causative factors include trauma, hormonal fluctuations during pregnancy, portal hypertension, pancreatitis, arterial degeneration, and atherosclerosis. SAA rupture results in life-threatening massive blood loss and should be treated proactively.[1–4]

Current common percutaneous endovascular treatment methods include coil embolization of splenic aneurysms, endovascular exclusion of splenic aneurysms with stent-graft placement, and bare-metal stent placement combined with aneurysm embolization. Depending on the SAA lesion location and shape, 1 or more of the above-described treatment methods can be utilized.[5–10] Transcatheter embolization for SAA is relatively simple: coils are delivered into the splenic artery and embolize either the aneurysm directly or the regions of the splenic artery proximal and distal to the aneurysm. The disadvantages include splenic infarction caused by total embolization and aneurysmal relapse caused by partial embolization.[6,7] The application of covered stent grafts allows for SAA exclusion while maintaining the blood flow in the splenic artery and is considered an ideal treatment. However, due to the current stiff stent delivery system and the tortuous nature of the splenic arteries, stent graft placement at the aneurysm site is challenging. Therefore, the covered stent graft is more commonly used for treating SAA in the proximal region of the splenic artery.[8]

In recent years, bare-metal stent combined with partial coil embolization has been used to treat the wide-neck SAA. Due to

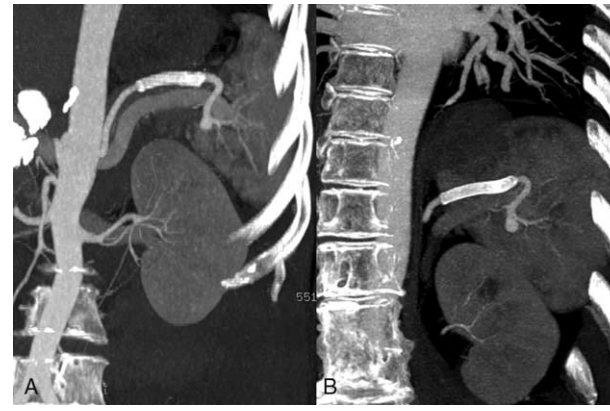

FIGURE 3. (A) Two weeks postembolization axial CT scan with contrast with 3-dimensional reconstruction showing postembolization segmental splenic infarction. (B) CT images with 3-dimensional reconstruction at 1-year follow-up show patency of the spleen artery and no aneurysm is identified.

the smaller diameter and softer nature of the bare-metal stent, their placement in the splenic artery is relatively easier than that of covered stents. Through a microcatheter, coils can be delivered and partially embolize the aneurysm while blood flow in the splenic artery is maintained.[9] Moreover, some researchers utilize multilayer stents to repair SAA with satisfying results.[10]

The SAA in the current patient was located in the middle segment of the main splenic artery with a largest diameter of approximately 2.8 cm, which completely meets the criteria for endovascular covered stent graft exclusion treatment. There is a lack of bony landmarks, and therefore accurate localization is challenging in the covered stent graft exclusion treatment of SAA. We suggest stent placement under the DSA Roadmap mode or the deployment of a separate guiding catheter to locate the aneurysm by continuously injecting contrast agents. Furthermore, for the tortuous splenic artery, the selection of an appropriate super-stiff guidewire during the procedure to provide sufficient support and overcome the difficulties related to stent graft delivery and release is necessary. Regular follow-up indicated a satisfactory efficacy proving the minimal invasiveness of stent graft exclusion treatment for SAA.

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