Diagn Interv Radiol 2005; 11:119-121

Endovascular stent graft treatment in a patient with splenic artery aneurysm

Kutlay Karaman, Levent Onat, Mustafa Şirvancı, Rüstem Olga

ABSTRACT

Splenic artery aneurysms are rare but important vascular lesions that constitute approximately 60% of all visceral arterial aneurysms. Splenic artery is the third most common localization of intraabdominal aneurysm formation. Rupture is the main complication that occurs in 3%-10% of the cases. We describe a case with a proximal splenic artery aneurysm. To preserve splenic function and reduce the risk of aneurysmal rupture, we used stent-graft to embolize the aneurysm treated percutaneously. The follow up of patient was uneventful after embolization. Endovascular embolization of the splenic artery aneurysm may prevent the need for emergency surgery and also offer an effective alternative surgical treatment.

Key words: • *splenic artery* • *aneurysm* • *embolization, therapeutic*

From the Departments of Radiology (K.K. ✉ *kutlaykaraman@ttnet.net.tr*, L.O., M.Ş.) and Cardiovascular Surgery (R.O.), Florence Nightingale Hospital, İstanbul, Turkey.

Received 14 December 2003; revision requested 15 February 2004; revision received 15 February 2004; accepted 25 March 2004.

The splenic artery is the third most common location of intraabdominal aneurysms, following the abdominal aorta and iliac arteries. Visceral arterial aneurysms are rare pathologies, the splenic artery constitutes 60%, hepatic artery 25%, and superior mesenteric artery 5%. Generally they are incidentally diagnosed on autopsies or abdominal radiographic examinations. Rupture is the most critical complication that occurs in 3%-10% of cases (1).

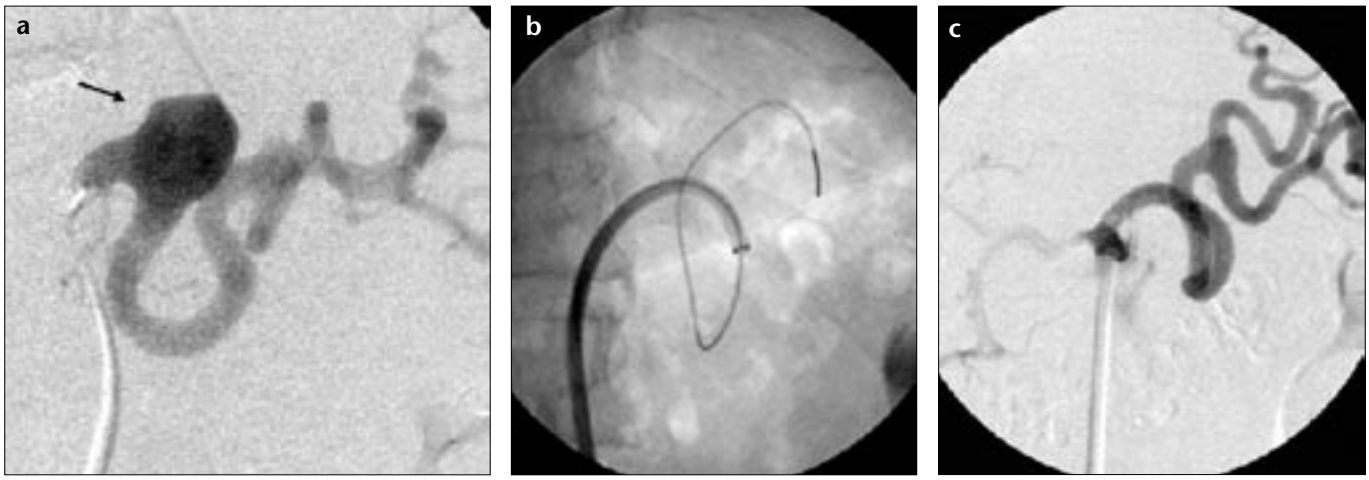
We present a case of splenic artery aneurysm that was detected with computed tomography (CT) and treated by endovascular procedure.

Case report

A 56-year-old man presented to our clinic with left upper abdominal quadrant pain and a well circumscribed, hypoechoic lesion was diagnosed in the pancreatic region with ultrasound (US). When examined with color Doppler US, the lesion was thought to be consistent with aneurysm. With the multidetector computed tomography (CT), which was performed to investigate the location of the aneurysm, as well as its relationship with surrounding tissues and possible additional pathologies, a partially calcified walled proximal splenic artery aneurysm measuring 2.5 cm in diameter was diagnosed (Figure 1). Physical examination of the patient was normal; he only had mild hypercholesterolemia in laboratory examinations. He was referred to our clinic for possible endovascular treatment by the cardiovascular surgery department. After the patient was informed about the procedure, angiography for both diagnostic and endovascular treatment was immediately planned. Clopidogrel (Plavix®, Sanofi Winthrop Industrie, Ambares, France) 1×75 mg and aspirin 1×300 mg were administered three days before treatment. The intervention was performed by using a transfemoral artery approach under local anesthesia. During the procedure, 5000 U bolus and 2500 U infusion of heparin were administered for anticoagulation. After abdominal aortography, which was performed using pigtail catheters with markers, the diameter of the aneurysm and the diameter of splenic artery, proximal and distal to the aneurysm, were measured. Subsequently, abdominal arteriograms were obtained and the celiac trunk and splenic artery were selectively catheterized. A saccular aneurysm of the proximal splenic artery measuring 2.8×2.5 cm was diagnosed (Figure 2a). Other segments of the splenic artery were normal. With appropriate technique, a 9F long vascular sheath (Super Arrow-Flex, Arrow International, Reading, PA, USA) was advanced over the guide wire (Amplantz guidewire, Boston Scientific, USA) for endovascular treatment. Through this sheath, an 8×50 mm wall graft was used to locate, but we were not able to advance the stent graft distally to the aneurysm. Because both the stent graft attached to the wall of the aneurysm and the carrier system were rigid, a relatively more flexible vascular sheath was advanced to the distal of the aneurysm

Figure 1. Multidetector CT angiography demonstrates aneurysm in the splenic artery *(arrow)*.

Figure 2 (below). a-c. Selective splenic arteriograms demonstrate the aneurysm **(a,** *arrow),* 9F vascular sheath advanced to the distal of the aneurysm **(b)**. Stent graft is inflated in the appropiate localization, aneurysm is out of circulation, and flow in the splenic artery is preserved **(c)**.



(Figure 2b). Afterwards, a stent graft was advanced through the vascular sheath distally and the vascular sheath was pulled back to proximal. With this maneuver, the stent graft was placed in the aneurysmal segment. Proper localization was determined with control angiograms and the stent graft was inflated. Repeated angiograms confirmed that the aneurysm was out of circulation, the splenic artery was patent, and parenchymal distribution was normal (Figure 2c). The patient was hospitalized for one day and later was followed up with clopidogrel 1×75 mg and aspirin 1×300 mg for two months. Multidetector CT angiography was performed two months after the procedure demonstrated that the aneurysm was thrombosed and stent localization and splenic artery branching were normal (Figure 3). The patient was put on annual follow ups with the recommendation of lifetime aspirin intake.

Discussion

Splenic artery aneurysms can be seen at any age, but are more commonly seen in the fifth and sixth decades. Splenic artery aneurysms are more common in women, are generally located in the middle and distal segment of the artery, and can be single or saccular form. In autopsy series the incidence is reported to be 1.6%, but in patients with cirrhotic portal hypertension this frequency increases to 7.1% (2).

Specific causes of splenic artery aneurysms remain unknown, although suspected etiological factors are thought to be atherosclerosis, focal arterial inflammation, pancreatitis, hypersplenism, portal hypertension, trauma, and hormonal and hemodynamic changes due to pregnancy.

Eighty percent of patients with splenic artery aneurysms are asymptomatic. Left upper abdominal quadrant pain, nausea, and vomiting can be presenting symptoms. Except for the rare splenic infarct complication, the most critical complication is rupture, which can be seen in 3%-10% of the cases. Splenic rupture is characterized by an acute onset of abdominal pain, hypotension, and shock and in 70% of cases is mortal. (3). Rupture of splenic artery aneurysms following liver transplantation have been reported (4). The reduction in portal vein resistance after liver transplantation is believed to increase splenic artery flow and the risk of aneurysm rupture. Although it is generally asymptomatic, early diagnosis and treatment of a splenic artery aneurysm is important because of its mortal complications. Left upper abdominal quadrant calcifications may be present on abdominal radiographs. B-mode and color Doppler US can be diagnostic. CT and magnetic resonance imaging demonstrate morphology and location of the aneurysm, possible accompanying pathologies,

Figure 3. Control multidetector CT angiography performed 2 months later demonstrates patent stent graft and splenic artery flow.

and are helpful for differential diagnosis. Treatment is recommended in symptomatic patients and for aneurysms larger than 2 cm in diameter (6). Currently, treatment options are surgery or endovascular procedures. Surgically, splenic artery ligation, aneurysmectomy, or splenectomy are the options. However, splenectomy does pose the additional risk of infection in patients with chronic liver disease. Embolization of the aneurysm while preserving the flow in the splenic artery and spleen is the optimal treatment option. Especially in proximal aneurysm cases, surgical partial resection of the aneurysm wall while preserving the flow of the splenic artery has been reported (6).

Endovascular treatment options such as coil embolization, detachable balloon occlusion, and stent graft with a complication frequency lower than surgery have been reported (3, 4, 7). In particular, for chronic liver disease patients who are awaiting transplantation, endovascular treatment is a better option because it is more easily employed and preserve splenic function (3, 4, 7).

Coil embolization should be the first choice of endovascular technique for distal splenic aneurysms. In some of the cases with tortuous splenic arteries, it may not be possible to advance stent grafts to the segment of the aneurysm. Coil embolization of a hilar located splenic artery aneurysm with balloon remodeling technique has been reported in one case (4).

Stent grafts are more suitable for proximally located aneurysms because of the rigidity of the carrier system. Wallgraft, which we used in our case, is a polyethylene terephthalate (PET) covered stent graft that is available in a range of diameters (6-12 mm) and lengths (20, 30, 50, 70 mm). Additionally, 14 mm diameter in 50 and 70 mm lengths are also commercially available. Another stent graft (Jomed International) covered with polytetrafluoroethylene (PTFE) for peripheric endovascular interventional procedures is commercially available (6-9 mm in diameter and 12-58 mm in length; 6-12 mm in diameter and 12-58 mm in length). While advancing these stent grafts to the segment of the aneurysm, two anatomical obstacles are present. The angle between the celiac trunk and both the abdominal aorta and tortuous splenic arteries may cause serious problems in advancing the stent graft to the segment of the aneurysm. In our case, we successfully placed the stent graft with vascular sheath maneuvers, but cases in which the placement into the aneurysm had failed have been reported.

Although there are few reported cases, stent graft teratment for splenic artery aneurysms appear to be a good alternative to surgery. There have been promising developments in the number and properties of embolization agents, but there is still a need for further clinical studies to determine the efficacy of treatment.

References

1. Shih A, Golden M, Mahler ER. Splenic artery aneurysm. Vas Med 2002; 7:155-156.
2. Bornet P, Medjoubi SA, Tissot A. Giant aneurysm of the splenic artery, a case report. Angiology 2000; 51:343-347.
3. Guillon R, Garcier JM, Abergel A, et al. Management of splenic artery aneurysms and false aneurysms with endovascular treatment in 12 patients. Cardiovasc Intervent Radiol 2003; 26(3):256-260.
4. Owens CA, Yaghmai B, Aletich V, Benedetti E. Coil embolization of a wide-neck splenic artery aneurysm using a remodeling technique. AJR Am J Roentgenol 2002; 179: 1327-1329.
5. Carr S, Pearce W, Vogelzang R, McCarthy W, Nemcek A, Yao J. Current management of visceral artery aneursyms. Surgery 1996; 120:627-634
6. Muscari F, Bossavy JP, Chaufour X, Ghouti L, Barret A. Laparoscopic exclusion of a splenic artery aneurysma case report. Vasc Endovascular Surg 2003; 37(4):297-300.
7. Marx M, Wack J, Baker E, Barakos J. Treatment of a splenic artery aneurysm with use of a stent-graft. J Vasc Interv Radiol 2002; 13(12):1282.