Splenic artery saccular aneurysm: endovascular approach or open surgery?

Aneurisma sacular de artéria esplênica: tratamento endovascular ou cirúrgico convencional?

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INTRODUCTION

Aneurysms can form in several different visceral branches of the abdominal aorta[1,2]. Although uncommon, with an incidence that accounts for around 5% of intra-abdominal aneurysms, the risk of mortality is great if this kind of aneurysm ruptures. This is why it is important to raise awareness of this vascular disease[3,4].

The most common site of splanchnic aneurysms is at the splenic artery[4] (60% of cases), with a prevalence in the general population of 0.1 to 2%[3]. Pregnancy is one of the clinical conditions that favors the appearance these aneurysms[4]. The explanation is that there is an increase of the splenic blood flow, in addition to changes at the elastin of the vessels. Around 40% of women diagnosed with splenic artery aneurysms with no obvious cause are multiparous and have had at least six pregnancies. Other clinical conditions that may be responsible for the emergence of these aneurysms are portal hypertension and/or splenomegaly, accounting for 10% of cases. The incidence of rupture is 2%, with 10% of mortality[3]. Due to the relative rarity of these cases, their severity, the diagnostic difficulties involved and the numerous treatment options, this paper discusses the therapeutic challenge posed by a splenic artery aneurysm.

PART I: CLINICAL CASE

A 56-year-old female patient with hypertension, chronic obstructive pulmonary disease, dyslipidemia and heart disease presented at the hospital with a history of abdominal pain in the left flank. Abdominal ultrasound image was suggestive of splenic artery aneurysm, which had been confirmed later by magnetic resonance angiography. Patient history included bilateral saphenectomy, left-side oophorectomy and two caesarean deliveries. General physical examination revealed nothing of significance. Her preoperative cardiac risk assessment was considered low risk.

The angiography study identified a saccular aneurysm of the proximal third of the splenic artery, with a diameter of 11 mm by 16 mm and a wide neck, more than 6 mm in circumference (Figure 1). There were no signs of rupture, nor of anatomic variations or significant changes to other visceral arteries. Even though diameter was smaller than 2.0 cm, since the aneurysm was saccular and symptomatic, surgery was indicated because of the risk of rupture.

Possible treatment options in this case were as follows[3]:

- Conservative, nonsurgical treatment;
- Proximal and distal ligature with aneurysmectomy and preservation of the spleen;
- Aneurysmectomy with splenectomy;
- Videolaparoscopic ligature of the splenic artery;
- Embolization of the aneurysm sac with coils and/or cyanoacrylate glue;
- Thrombosis of the aneurysm sac by thrombin injection;
- Endovascular exclusion of the aneurysm with a covered stent.

PART II – WHAT WAS DONE?

The patient declined both conventional and laparoscopic surgeries, so endovascular treatment was indicated. Since the neck was wide, it was decided to cover the neck with a stent to provide support for the subsequent procedure of coil insertion into the aneurysm sac. Local anesthetic was administered and femoral access employed to insert a noncovered stent (5.25 mm × 6.5 mm, BALT®) into the proximal third of the splenic artery, covering the aneurysm neck. A 0.014" guidewire was

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Financial support: None.
Conflicts of interest: No conflicts of interest declared concerning the publication of this article.
Submitted on: 03.24.13. Accepted on: 04.16.13.

Study carried out at the Department of Surgery and Orthopedics of Faculdade de Medicina de Botucatu – UNESP.

 http://dx.doi.org/10.1590/jvb.2013.045

threaded through the mesh and used to guide the tip of a microcatheter. Four coils were then inserted (10 × 30 mm – Axium®; 7 × 20 mm – Hydrocoil®; 18 × 30 mm – Micrusphere®, and 13 × 30 mm – GDC SR®). At the end of the procedure, the aneurysm was occluded, with no blood flow inside, and the splenic artery was patent (Figure 2).

In the immediate post-operative period the patient was free from intercurrent conditions and had no complaints of abdominal pain. No digestive or hematological problems were observed. At 3-month follow-up the patient was well, with no complaints and control angiography demonstrated a patent splenic artery (Figure 3).

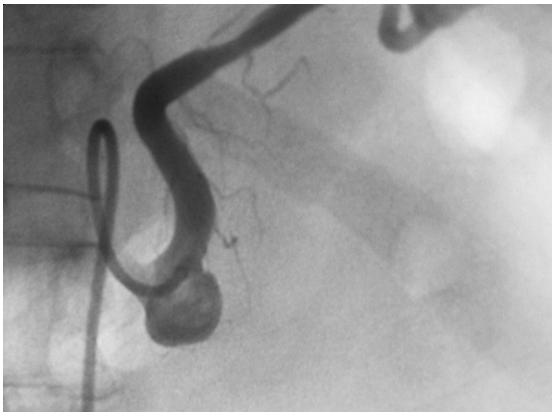

Figure 1. Selective angiograph of the splenic artery showing a wide-necked saccular aneurysm of the proximal segment.

DISCUSSION

Symptomatic splenic artery aneurysms must always be treated. When asymptomatic, treatment is indicated if diameter is greater than 2.0 cm, if there is progressive increase[3], as preoperative preparation for liver transplantation and if the patient is a pregnant woman or a woman at childbearing age[5]. Pseudoaneurysms are a medical emergency demanding treatment, irrespective of size or signs and symptoms of rupture, because, when untreated, the mortality is almost 50%[6].

Sadat et al.[7], conducted a systematic review and concluded that there is no consensus on treatment when asymptomatic, and that, when symptomatic, the treatment must be immediate, whether by conventional surgery, laparoscopy or endovascular techniques, and the choice should be based on the patient's clinical condition, the possible approaches to the abdomen, the anatomic situation of the artery itself, and, of course, the patient acceptance of the procedure.

Conservative observational treatment is reserved for patients in critical clinical states, when aneurysms are smaller than 2.0 cm in diameter and in women who have no prospect of becoming pregnant[5], although this last criterion is not absolute, particularly when dealing with saccular aneurysms[3].

Open surgery was the standard treatment until the end of the twentieth century[6] and is generally indicated for patients at low risk, for trunk lesions or when there are also aneurysms of the aorta or intestinal arteries, or indeed for cases in which endovascular treatment

Figure 2. Intraoperative control angiograph showing the aneurysm excluded with coils. The nitinol support stent has low radiopacity and does not show up on the angiograph.

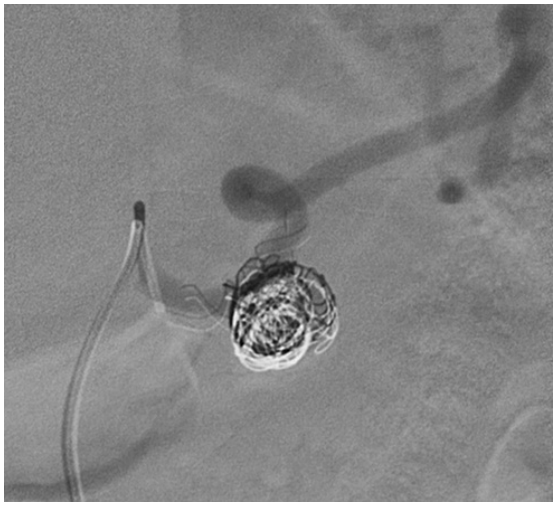

Figure 3. Two-year follow-up arteriograph showing a patent splenic artery and the excluded aneurysm, with no internal blood flow.

was unsuccessful[8]. Under general anesthesia, xyphopubic, transversal or subcostal incisions can be used for access[3]. Conventional surgical treatment is by aneurysmorrhaphy or double ligature of the splenic artery with or without resection of the spleen, or may also be combined with aneurysmectomy with arterial reimplantation or bypass grafts. Revascularization of the spleen may not be necessary if the aneurysm is located at the proximal third of the splenic artery, since in such cases circulation can be supplied by the short gastric arteries[3]. It cannot, however, be guaranteed that the spleen will be unaffected[3,9]. Open surgery procedures can also be conducted with good results and less invasiveness using videolaparoscopic surgery[10,11] with the use of staplers, but this demands training in intraoperative ultrasound and should not be used with patients who are hemodynamically unstable or when there are signs of rupture[6].

In cases of acute rupture, the retrocavity of the epiploon can be accessed after sectioning the gastroepiploic ligament, providing access to the proximal section of the splenic artery or even the suprailiac aorta. Anterior access tends to ligate the short gastric arteries and the left gastroepiploic artery, increasing the chance of splenic infarction. Retroperitoneal access preserves collateral circulation to the spleen[6].

Endovascular treatment is indicated in cases involving high-risk, a hostile abdomen and distal lesions. Options include embolization of the splenic artery with coils and exclusion of the organ,[9,12,13] or the placement of a covered stent covering the aneurysm neck[14-16]; or embolization with coils, as described by Jayanthi et al.[5] for a hilar aneurysm, with preservation of the spleen. Advantages are minimal invasiveness and preservation of blood flow to the spleen, but it requires the use of radiation and contrasts, can be limited by factors such as a tortuous splenic artery, the position and size of the aneurysm (hilar aneurysms present difficulties, for example) and durability and patency are unknown[6].

Another alternative should be the injection of fibrin glue into the aneurysm sac[3,17].

Preservation of the spleen should always be a consideration because splenic infarction predisposes patients to infections[5].

An interesting option was chosen in the case described here: safe, successful and complete exclusion of the saccular aneurysm with minimally invasive surgery that managed to preserve blood circulation in the splenic artery, avoiding ischemia and the risk of infarctions in the spleen. Similar procedures had already been successfully performed on other visceral arteries, such as the renal artery, for example[18].

In conclusion, aneurysms of the splenic artery should be treated to avoid rupture and, whenever possible, protecting the organ's viability. Although it is not the gold standard[19], endovascular treatment can be considered a preferred form of treatment in these cases, offering the advantages of minimal invasiveness, definitive resolution and the chance of preserving the organ.

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Final approval of the article*: RM, MLS, RGJ, MB, JVOM, RAY, WBY
Statistical analysis: JVOM
Overall responsibility: JVOM

*All authors should have read and approved of the final version of the article submitted to J Vasc Bras.