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Case report

Endovascular Treatment of a Ruptured Giant Splenic Artery Aneurysm with Viabahn Stent-Grafts: A Case Report

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Abstract

Background: Endovascular techniques are typically the preferred approach for treating patients with splenic artery aneurysms.

Case Presentation: We present the case of a 57-year-old man with upper left abdominal pain for 6 months. CT angiography revealed a 5 cm aneurysm of the splenic artery and endovascular treatment was recommended. While performing the procedure, the splenic artery aneurysm ruptured. Consequently, two Viabahn stent-grafts were deployed, successfully excluding the aneurysm. At the 6-month follow-up CT scan, evidence of the correct exclusion location of the stent-grafts was observed. The patient became completely asymptomatic at follow-up.

Conclusions: The endovascular treatment of ruptured giant splenic artery aneurysms may be successfully performed with Viabahn stent-grafts.

Keywords: Splenic artery aneurysm, Visceral artery aneurysm, gia$nt aneurysm, Endovascular treatment, Stent-graft, Case report

List of Abbreviations: CT: Computed Tomography; SAA: Splenic Artery Aneurysms

Background

Vascular artery aneurysms are a rare condition, with estimated prevalence rates ranging from 0.01% to 0.2% [1]. Splenic artery aneurysms (SAAs) constitute the most prevalent type (60%) of visceral artery aneurysms [2].

Various treatment options are presently available for SAAs, encompassing open or laparoscopic surgery as well as endovascular techniques. [3]. Due to its reduced invasiveness and lower morbidity compared to surgery, the endovascular approach is generally preferred for unruptured SAAs. [1,4]. Endovascular techniques include embolization with coils, liquid embolic agents, glue, and percutaneous thrombin injection; endovascular repair with stent-grafts, flow-diverting stents, neurovascular double-layer stents, overlapping uncovered stents and combined techniques [1].

Although endovascular treatment of SAAs can usually be safely performed, complications may occur. Splenic infarction, abscesses, coil migration, splenic artery dissection and artery rupture have been described [1,5].

Unlike transcatheter embolization, which carries a potential risk of causing ischemia in the target organ, stent grafting effectively seals off the aneurysm while blood flow through the affected visceral artery is maintained effectively [1].

We report the case of an intra-procedural rupture of a giant (≥ 5cm) SAA, successfully managed by the placement of Viabahn stent-grafts.

The article adheres to the CARE (Case Report) guidelines, and the CARE checklist is documented in Table 1. The patient provided informed consent for publication.

Table 1: CARE Checklist.

Topic	Item	Checklist item description	Reported on
Title	1	The diagnosis /intervention of primary focus followed by the words "case report"	Title, page 1
Keywords	2	2 to 5 keywords that identify diagnoses or interventions in this case report, including "case report"	Keywords, page 1
Abstract	3a	Introduction: What is unique about this case and what does it add to the scientific literature?	Abstract, Paragraph 2, page 1
	3b	Main symptoms/important clinical findings	Abstract, Paragraph 2, page 1
	3c	The main diagnoses, therapeutic interventions, and outcomes	Abstract, Paragraph 2, page 1
	3d	Conclusion—main "take-away" lesson(s) from this case	Abstract, Paragraph 3, page 1
Introduction	4	One or two paragraphs summarizing why this case is unique (may include references)	Background, Paragraph 5, page 2
Patient Information	5a	De-identified patient specific information	Case presentation, Paragraph 1, page 3
	5b	Primary concerns and symptoms of the patient	Case presentation, Paragraph 1, page 3
	5c	Medical, family, and psycho-social history including relevant genetic information	Case presentation, Paragraph 1, page 3
	5d	Relevant past interventions with outcomes	Case presentation, Paragraph 1, page 3
Clinical Findings	6	Significant physical examination (PE) and important clinical findings	Case presentation, Paragraph 1, page 3
Timeline	7	Historical and current information from this episode of care organized as a timeline	N/A
Diagnostic Assessment	8a	Diagnostic testing (such as PE, laboratory testing, imaging, surveys)	Case presentation, Paragraph 1, page 3
	8b	Diagnostic challenges (such as access to testing, financial, or cultural)	N/A
	8c	Diagnosis (including other diagnoses considered)	Case presentation, Paragraph 1, page 3
	8d	Prognosis	N/A
Therapeutic Intervention	9a	Types of therapeutic intervention (such as pharmacologic, surgical, preventive, self-care)	Case presentation, Paragraphs 2-3, page 3
	9b	Administration of therapeutic intervention (such as dosage, strength, duration)	N/A
	9c	Changes in therapeutic intervention (with rationale)	Case presentation, Paragraph 2, page 3

Follow-up and Outcomes	10a	Clinician and patient-assessed outcomes (if available)	Case presentation, Paragraph 3, page 3
	10b	Important follow-up diagnostic and other test results	Case presentation, Paragraph 3, page 3
	10c	Intervention adherence and tolerability	N/A
	10d	Adverse and unanticipated events	Case presentation, Paragraph 2, page 3
Discussion	11a	A scientific discussion of the strengths AND limitations associated with this case report	Discussion, Paragraphs 1-4 , page 4
	11b	Discussion of the relevant medical literature with references	Discussion, Paragraphs 2-4,, page 4
	11c	The scientific rationale for any conclusions (including assessment of possible causes)	Conclusions, page 4
	11d	The primary "take-away" lessons of this case report (without references) in a one paragraph conclusion	Conclusions, page 4
Patient Perspective	12	The patient should share their perspective in one to two paragraphs on the treatment(s) they received	N/A
Informed Consent	13	Did the patient give consent? Please provide if requested	Yes

Case Presentation

We present the case of a 57-year-old man who complained of upper left abdominal pain for 6 months. A CT angiography showed a 5 cm splenic artery aneurysm (Figure 1). His past medical history was not significant, and he had no significant comorbidities.

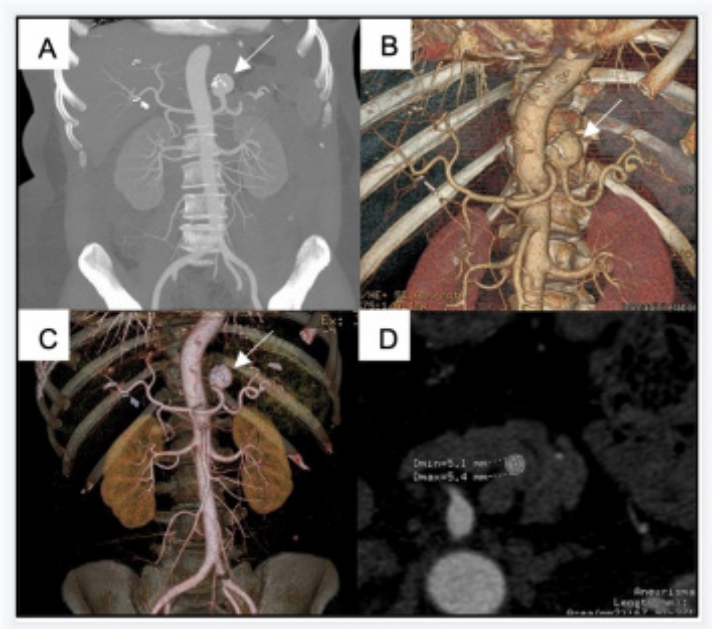

Figure 1: Preoperative CT angiography. MIP (A) and 3D reconstructions (B and C) show a 5 cm splenic artery aneurysm (arrows). The diameter of the splenic artery is 5 mm (D).

After a multidisciplinary discussion, because of the symptoms and the risk of spontaneous rupture in relation to the remarkable size of the aneurysm, endovascular treatment was recommended. A Cardiatis Multilayer Flow Modulator stent (7X60mm) was initially chosen (Cardiatis, Isnes, Belgium). Under conscious sedation and local anesthesia, the right femoral artery access was obtained and a guidewire was delivered into the distal end of the splenic artery. A 7 Fr guiding multipurpose catheter (Destination, Terumo Medical Corp., Somerset, NJ) was placed over the guidewire. Then, a super-stiff guidewire (Steerable 200 cm) replaced the catheter in order to deliver the Cardiatis stent. Unfortunately, during these maneuvers, the rupture of the SAA occurred. Due to this complication,

the treatment strategy was modified. An occluding balloon-catheter was deployed, and, subsequently, two 8 mm Viabahn stent-grafts were successfully placed under digital subtraction angiography roadmap guidance to exclude the aneurysm. Repeated angiography confirmed good location and shape of stent-grafts. Patency of the distal portion of the splenic artery was evidenced and no obvious residual aneurysm was visualized (Figure 2).

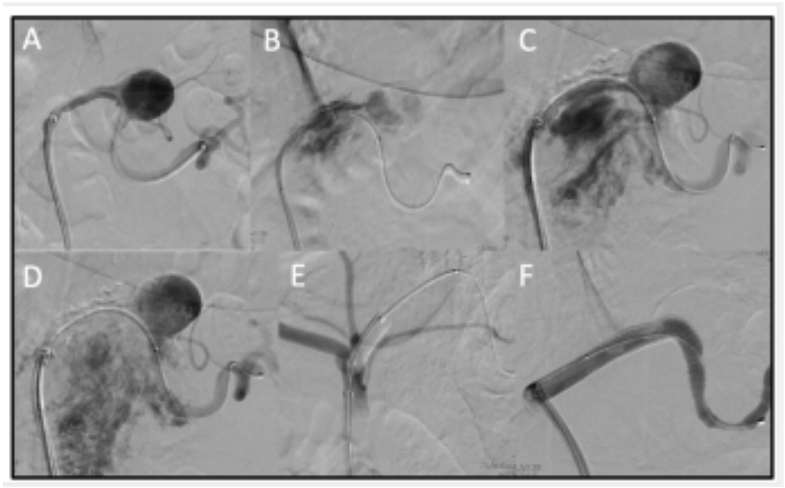

Figure 2: Digital subtraction angiography (A-F). During the catheterization, the rupture of the aneurysm occurred (B-D). The treatment strategy changed: an occluding balloon-catheter and two 8 mm Viabahn stent-grafts were deployed under digital subtraction angiography roadmap guidance, to exclude the aneurysm (E,F).

Complete exclusion of the aneurysm and patency of the splenic artery were confirmed at 6 months CT follow-up imaging (Figure 3). The patient became completely asymptomatic at follow-up.

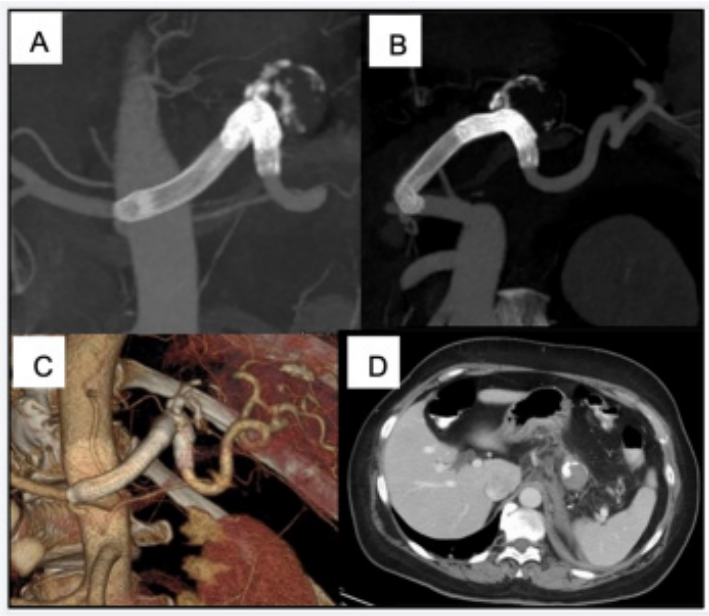

Figure 3: CT angiography at 6-month follow-up: MIP (A) and 3D (B, C) reconstructions show complete exclusion of the aneurysm, patency of the splenic artery, and correct location of stent-grafts. Axial CT image (D) evidence normal splenic parenchyma in the venous phase, without signs of complications.

Discussion

In our case report we successfully treated an intraoperative rupture of a giant SAA using Viabahn stent-grafts.

In patients with ruptured SAA discovered at laparotomy, the recommended treatment is surgery, with ligation of the splenic artery, with or without splenectomy [3]. However, in case of ruptured SAA diagnosed on preoperative imaging studies, both the surgical and endovascular techniques are appropriate options [1,3,6].

In our case, the SAA rupture occurred during the endovascular treatment and, therefore, the exclusion of the aneurysm was first

approached endovascularly. Instead of a Cardiatis multilayer flow modulator, that maintains a reduced flow in the aneurysmal sac, we decided to use a Viabahn stent-graft, that can completely exclude the aneurysm.

The use of a Viabahn stent-graft in the treatment of acute ruptured SAAs has been rarely reported. *Varnagy, et al*., [7] and *Ouchi, et al*., [8] reported two cases of the successful endovascular exclusion of spontaneously ruptured SAAs using Viabahn stent-grafts in a 44-year-old-man and a 43-year-old man, respectively. Furthermore, *Venturini, et al*., reported the use of Viabahn stent-grafts in 25 emergency procedures for ruptured splenic artery pseudoaneurysms [1].

Conclusions

Endovascular treatment of SAAs has become the preferred first-line approach for patients with symptomatic, unruptured, or asymptomatic large-size aneurysms. The use of a Viabahn stent-graft can be an alternative to surgery for ruptured SAAs and is the recommended option when an SAA rupture occurs during endovascular procedures.

Declarations

Ethics Approval and Consent to Participate

Not applicable.

Consent For Publication

Written consent to publish this case was obtained from the father of the patient.

Availability of Data and Materials

Not applicable.

Competing Interests

The authors declare that they have no competing interests.

Funding

No funding was obtained for this study.

Authors' Contributions

RC was a major contributor in writing all the parts of the case report. CMEWP and MN provided valuable assistance in the writing process. During the writing process, GF, MR, MA, PP, MT, FL and DF contributed with critical feedback, playing a pivotal role in enhancing the report's overall quality and clarity. All authors contributed to the writing and review of the manuscript and approved the final version for submission.

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Not applicable.

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