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Rafael de Athayde Soares *

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Case Report

Wrapsody™ Stent Graft for Popliteal Aneurysm Repair in a Patient with Concomitant Aortic and Popliteal Disease: a Case Report

João Batista Moniz Barreto de Aragão[1, 2], Rodrigo Neves Lopes [1], Luiza Lopes Ventura Cabral [3], Bianca Nogueira Lima de Figueiredo [4], Vitor Ceu Bressan [5], Gustavo Fraiha Pegado [1], Maria Fernanda Baumann [6], Filipe Calado Rocha [7], Raniere Manjella Vieira de Oliveira [8], Rafael de Athayde Soares [9] *

[1]Vascular Surgery Service, Rede Hospital Casa, Rio de Janeiro, Rio de Janeiro, Brazil.

[2]RJM Serviços Médicos, Rio de Janeiro, Rio de Janeiro, Brazil.

[3]Hospital Central da Polícia Militar do Rio de Janeiro, Rio de Janeiro, Rio de Janeiro, Brazil.

[4]Hospital Municipal Evandro Freire, Rio de Janeiro, Rio de Janeiro, Brazil.

[5]Instituto Federal do Rio de Janeiro, Rio de Janeiro, Rio de Janeiro, Brazil.

[6]Hospital Dicamp, Rio de Janeiro, Rio de Janeiro, Brazil.

[7]Hospital Israelita Albert Sabin, Rio de Janeiro, Rio de Janeiro, Brazil.

[8]Hospital da Praia Brava, Angra dos Reis, Rio de Janeiro, Brazil.

[9]Instituto de Assistência Médica ao Servidor Público Estadual de São Paulo (IAMSPE), São Paulo, Brazil.

***Corresponding Author:** Rafael de Athayde Soares, Rua Pedro de Toledo, 1800 - Vila Clementino, São Paulo - SP, CEP: 04039-000, Brazil.

Received Date: Mach 06, 2026 | **Accepted Date:** April 03, 2026 | **Published Date:** April 16, 2026

Citation: João Batista Moniz Barreto de Aragão, Rodrigo N. Lopes, Ventura Cabral LL, Lima de Figueiredo BN, Vitor C. Bressan, et al, (2026), Wrapsody™ Stent Graft for Popliteal Aneurysm Repair in a Patient with Concomitant Aortic and Popliteal Disease: a Case Report, *J Clinical Cardiology and Cardiovascular Interventions*, 9(6); **DOI:10.31579/2641-0419/561**

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Abstract:

This case report describes the endovascular treatment of a 77-year-old man with concomitant abdominal aortic and left popliteal artery aneurysms. The patient presented with abdominal pain and a pulsatile mass in the left popliteal fossa. Imaging revealed a fusiform infrarenal aortic aneurysm and a popliteal artery aneurysm, along with significant stenosis of the superficial femoral artery. The aortic aneurysm was treated with a standard bifurcated endograft. The popliteal aneurysm was excluded using two Wrapsody™ stent grafts. At six-month follow-up, both aneurysms remained excluded and the stents were patent. This case highlights the potential off-label use of the Wrapsody™ stent graft in peripheral arteries, particularly when flexibility and radial strength are required. The device may offer a feasible alternative when conventional arterial stent grafts are not suitable or available.

Key words: popliteal artery aneurysm; endovascular repair; stent graft; wrapsody; case report

Introduction

Popliteal artery aneurysms are the most common peripheral arterial aneurysms, accounting for up to 85% of cases [1] and are associated with concurrent abdominal aortic aneurysms in 40–50% of patients [2] . Although less likely to rupture than aortic aneurysms, popliteal aneurysms can lead to thromboembolism and limb ischemia, warranting intervention in symptomatic patients or when larger than 2 cm or containing intraluminal thrombus [3].

Minimally invasive endovascular techniques have increasingly replaced open surgical repair for both aortic aneurysms and popliteal artery aneurysms, offering reduced perioperative morbidity and faster recovery [4]. The use of bifurcated endografts to manage aortic aneurysms is well established, with multiple devices commercially available and supported by robust clinical evidence [5]. In contrast, endovascular repair of popliteal artery aneurysms remains more controversial due to variable anatomic challenges, the dynamic environment of the popliteal artery, and limited long-term data [6].Advancements in covered stent graft technology have

expanded minimally invasive options for treating popliteal aneurysms. Devices originally designed for arteriovenous access or other peripheral indications are now being used off-label in selected arterial cases [7].. The Wrapsody™ cell-impermeable endoprosthesis (Merit Medical Systems, Inc., South Jordan, Utah, USA) combines a self-expanding nitinol frame with a nonporous fluoropolymer covering to reduce neointimal hyperplasia and thrombosis. Although approved for maintaining arteriovenous access patency, its mechanical properties (flexibility, radial strength, and sealing ability) make it a potential option in off-label arterial applications when arterial stent grafts are not suitable or available. However, its use in the popliteal artery remains poorly documented.

This case report presents the endovascular treatment of concomitant abdominal aortic and left popliteal artery aneurysms using a standard bifurcated aortic endograft for the infrarenal aorta and the off-label placement of two Wrapsody™ stent grafts for the popliteal artery.

This case report was prepared in accordance with the CARE Equator guidelines.

Case Description

Presentation

A 77-year-old male patient with cardiac insufficiency, chronic obstructive pulmonary disease, hypertension, type 2 diabetes mellitus, and obesity presented to the emergency department with abdominal pain that had persisted for 12 hours and was unresponsive to analgesics. He also reported discomfort due to a pulsatile mass in the left popliteal region. His medical history included a known abdominal aortic aneurysm and a left popliteal artery aneurysm, diagnosed 18 months earlier. At that time, he declined surgical intervention.

On examination, he exhibited abdominal tenderness and a palpable pulsatile mass in the popliteal fossa, without signs of local inflammation. No other symptoms were reported.

Imaging findings

Given the patient's symptoms and vascular history, a computed tomography angiography of the abdomen, pelvis, and lower limbs was performed. The scan revealed a fusiform infrarenal aortic aneurysm measuring 56 × 49 mm in diameter and 62 mm in length, with an intraluminal thrombus (Figure 1A). A second aneurysm (42 × 39 mm in diameter and 75 mm in length) was identified in the left popliteal artery, also fusiform and partially thrombosed (with a mural thrombus) (Figure 1B).

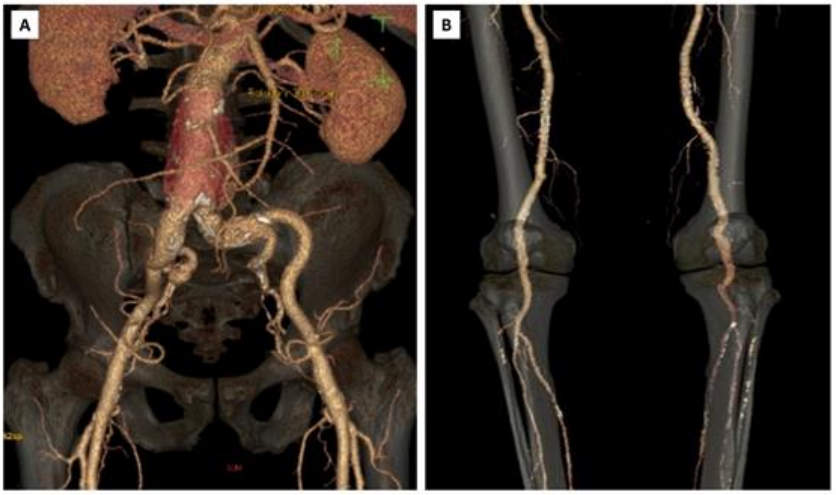

Figure 1: Three-dimensional reconstructions from computed tomography angiography. (A) Fusiform infrarenal abdominal aortic aneurysm measuring 56 × 49 mm in diameter and 62 mm in length, with mural thrombus. (B) Left popliteal artery aneurysm measuring 42 × 39 mm in diameter and 75 mm in length, also with mural thrombus, involving the mid and distal segments.

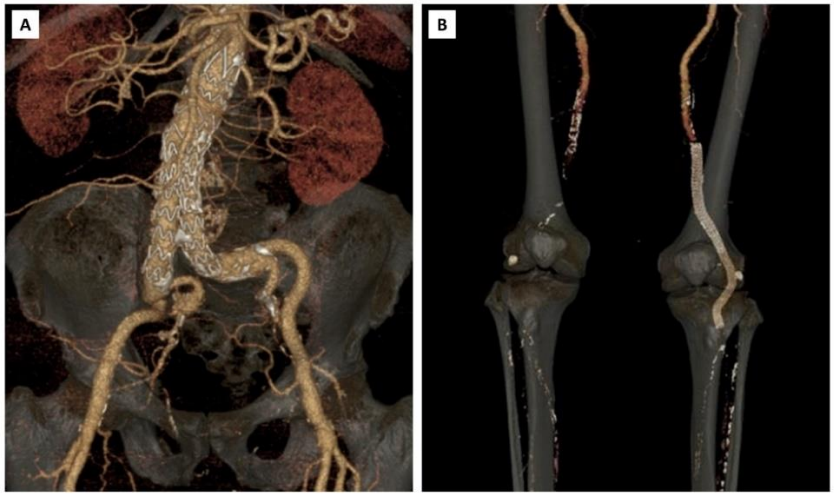

Figure 2: Three-dimensional reconstructions from follow-up computed tomography angiography at six months. (A) Exclusion of the infrarenal abdominal aortic aneurysm with bifurcated endograft in place and no evidence of endoleak. (B) Exclusion of the left popliteal artery aneurysm, with both endografts patent and in the appropriate position.

Diagnostic hypothesis and surgical planning

With no other identifiable source of the abdominal pain on tomography angiography, acute expansion of the aortic aneurysm was suspected. The patient was admitted to the intensive care unit for hemodynamic monitoring and beta-blocker therapy. After preoperative assessment, the multidisciplinary team determined that endovascular repair was the most appropriate treatment approach given the patient's comorbidities, refusal of open surgery, and history of poor adherence to follow-up.

Although the popliteal aneurysm was not life-threatening at the moment of the intervention, the team decided to treat both aneurysms during the same procedure. This decision was based on the patient's symptoms and the potential risk of thrombosis of the popliteal aneurysm during arterial clamping for the aortic repair. At that time, the Wrapsody™ device was readily available and selected for endovascular treatment of the popliteal artery aneurysms.

Intervention

On the day following admission, the patient underwent endovascular repair of aneurysms. Both common femoral arteries were punctured under direct visualization to obtain arterial access. Diagnostic angiography revealed aneurysmal dilation of the left popliteal artery involving the suprapatellar, retropatellar, and infrapatellar segments. A subsequent angiogram of the left lower limb was performed to delineate the full extent of the aneurysm. This second imaging confirmed a hemodynamically significant stenosis of the superficial femoral artery, in addition to the previously described aneurysmal changes.

A 12F sheath was introduced into the left common femoral artery. The femorodistal axis was catheterized using a vertebral angiographic catheter over a SplashWire guidewire (Merit Medical Systems, Inc., South Jordan, Utah, USA). Balloon angioplasty of the superficial femoral artery was performed using a 6 × 40 mm scoring balloon (TriWedge™, BrosMed Medical Co., Ltd., Dongguan, Guangdong, China) over an Amplatz 0.035" guidewire. Subsequently, two Wrapsody™ stent grafts (Merit Medical Systems, Inc., South Jordan, Utah, USA) were deployed: an 8 × 125 mm stent anchored distally at the lower neck of the aneurysm and a 10 × 125 mm stent overlapping 20 mm with the first and anchored at the upper neck of the aneurysm.

Postdilatation was performed using Manatee semi-compliant balloon catheters (8 × 80 mm and 9 × 120 mm; BDC-PTA, Qmedics AG, Flurlingen, Switzerland). Final angiography confirmed the successful exclusion of the aneurysm, correction of the superficial femoral artery stenosis, and restoration of distal flow through the plantar arch.

The infrarenal aortic aneurysm was subsequently treated with a bifurcated endograft introduced via femoral access. After correct positioning and deployment of the main body and contralateral limb, balloon molding was performed to ensure sealing. Final angiography confirmed complete exclusion of the aneurysm, with no evidence of endoleak. The procedure was concluded without complications, and vascular access sites were closed with arteriorrhaphy.

Outcomes

The patient recovered well after the procedure and was discharged without complications on the sixth postoperative day.

At six-month follow-up, a computed tomography angiography showed complete exclusion of the infrarenal aortic aneurysm by the bifurcated endograft, which extended from just below the origin of the renal arteries to both common iliac arteries. The endograft exhibited normal morphology, with no thrombus formation and no signs of endoleak (Figure 2A).

In the left popliteal artery, the stent grafts remained patent. The aneurysm was significantly reduced in diameter, now measuring 30 mm at its widest point. Mild restenosis (30–40%) was observed at the distal segment of the stented area, but without clinical consequences (Figure 2B). Three years after the procedure, the patient continues regular outpatient follow-up with no reported complications.

Discussion

This case illustrates the feasibility of using a fully endovascular approach to treat concomitant abdominal aortic and popliteal artery aneurysms in a high-risk patient, including the successful use of a covered stent not originally indicated for arterial aneurysm repair. While endovascular aneurysm repair has become the standard of care for infrarenal aortic aneurysms in anatomically suitable patients [5], its application in popliteal artery aneurysms remains less well-defined. In this case, the decision to treat both aneurysms in a single session was influenced by the acute presentation of the abdominal aneurysm and by the presence of a pulsatile, thrombus-filled popliteal aneurysm associated with significant stenosis, which raised concern for thrombosis during femoral clamping. Moreover, treating the popliteal lesion simultaneously minimized the burden of a second intervention in a frail patient.

Current evidence on endovascular treatment of popliteal aneurysms remains heterogeneous. The POPART registry indicates that patency rates at 12 and 24 months are lower in patients with popliteal artery aneurysm treated with endovascular repair compared to those treated with open repair [8]. A Cochrane review [6] concluded that, at one year, surgery may provide better primary patency than endovascular repair, although assisted primary patency rates were similar between groups. At four years, there was no clear benefit from either endovascular stent graft or surgery regarding primary or assisted primary patency. Importantly, both operating time and hospital stay were reduced in the endovascular group, suggesting that this approach may represent a viable alternative to open repair in selected patients.

One of the main challenges in the endovascular treatment of popliteal aneurysms is selecting a stent graft with adequate flexibility and radial strength to adapt to the joint's repetitive motion and curvature. The Wrapsody™ cell-impermeable endoprosthesis combines a self-expanding nitinol framework with a nonporous fluoropolymer lining. This configuration provides the flexibility to accommodate joint movement and the radial strength necessary for effective and durable aneurysm exclusion. Although arterial-specific covered stents are available, none were accessible during the procedure, reinforcing the need for adaptable solutions in emergent or resource-limited scenarios.

In this case, the stent graft adapted well to the arterial curvature, maintained patency at 3 years, and demonstrated no evidence of mechanical failure, kinking, or endoleak. Although the device's use in popliteal aneurysms remains off-label, its performance supports further exploration of its role in select arterial applications. Importantly, this case underscores how thoughtful, anatomy-driven device selection can extend the benefits of endovascular therapy even in scenarios where standard options are limited.

Conclusion

This case demonstrates the feasibility of a fully endovascular approach to concomitant abdominal aortic and popliteal artery aneurysms in a high-risk patient. The favorable outcome supports the consideration of tailored, anatomy-driven strategies and highlights the potential role of the Wrapsody™ stent graft as an off-label option in selected arterial scenarios.

Acknowledgements:

The authors thank Morgana Moretti, PhD, for supporting manuscript writing and editing.

Statements And Declarations

Ethical considerations

All procedures in this study followed the ethical standards of the 1964 Helsinki Declaration and its later amendments. The research ethics committee at Universidade do Grande Rio Professor José de Souza Herdy, approved this study under protocol number 6.164.201 and certificate of presentation of ethical appreciation number 68549822.6.0000.5283.

Consent to participate

Written informed consent was obtained from the patient for the publication of this case report.

Consent for publication

Written informed consent was obtained from the patient for the publication of this case report.

Declaration of conflicting interests

The authors have no conflict of interest to declare.

Funding statement

The authors had full editorial control of the paper and provided their final approval of all content. The authors received no additional financial support for the authorship of this article.

Data availability

The authors confirm that the data supporting the findings of this study are available within the article.

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DOI:10.31579/2641-0419/561

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