



Popliteal Artery Aneurysm: Clinical Presentation and Management

Vinícius Eduardo de Oliveira¹, Gustavo Medeiros Andrade¹, João Vinícius Galliêta de Carvalho¹, Gabriel Carvalho Alves¹, Lucas Eduardo de Jesus Ferreira Brito¹, Warllyson de Almeida Bezerra¹



<https://doi.org/10.36557/2674-8169.2025v7n12p1319-1327>

Artigo recebido em 10 de Novembro e publicado em 20 de Dezembro de 2025

ORIGINAL RESEARCH ARTICLE

ABSTRACT

A preference for endovascular treatment was observed in older patients with high cardiovascular risk and acute ischemia. Popliteal artery aneurysms ≤ 2.5 cm showed favorable outcomes with conservative management. Symptomatic patients treated endovascularly had higher reintervention rates.

Keywords: Aneurysm, Popliteal Artery, Treatment.

Aneurisma de la Arteria Poplítea: Presentación Clínica y Manejo

RESUMEN

Se observó una preferencia por el tratamiento endovascular en pacientes de mayor edad, con alto riesgo cardiovascular e isquemia aguda. Los aneurismas de la arteria poplítea $\leq 2,5$ cm mostraron resultados favorables con manejo conservador. Los pacientes sintomáticos tratados por vía endovascular presentaron mayores tasas de reintervención.

Palabras clave: Aneurisma, Arteria Poplítea, Tratamiento.

Instituição afiliada – ¹UNIVERSIDADE FEDERAL DE GOIÁS

Autor correspondente: Vinícius Eduardo de Oliveira vinicius.eo2000@gmail.com

This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).



INTRODUCTION

“A pulsatile bulge that, if ruptured, violently produces a gush of bright blood.”¹

The history of aneurysms dates back approximately 5,000 years, and the terminology used during the earliest millennia remains unknown. *Aneurysm* is a word of Greek origin meaning dilation. Its earliest recorded mention appears in the Ebers Papyrus, dating to approximately 1550 BC.

In 250 AD, Antyllus, a Greek surgeon, innovated the treatment of peripheral aneurysms by introducing a technique that would later bear his name. The Antyllus technique consisted of proximal and distal ligation of the artery affected by the aneurysm, opening the aneurysmal sac to evacuate its contents, and leaving it open to heal by secondary intention. In the case of popliteal artery aneurysm (PAA), the technique included the use of a tourniquet.¹ This procedure, performed without the benefits of modern anesthesia and antisepsis, was extremely dangerous for its time. Still in the same century, Percival Pott advocated amputation as the best treatment for patients with symptomatic PAA.²

John Hunter, regarded as the father of experimental surgery,¹ in December 1758, broke away from teachings that had been applied for more than 200 years and brought new impetus to the treatment of PAA and arterial surgery. By performing ligation of the femoral artery at the level of the adductor canal, proximal to the aneurysm, he demonstrated that collateral circulation could be preserved and that pressure within the aneurysm could be reduced, thereby preventing local hemorrhage while maintaining the viability and integrity of the limb.³ Subsequently, with the advent of the “Antiseptic Era,” resection of the aneurysmal sac became possible, yielding superior results compared with the operation described by John Hunter.¹

Conventional surgery is a safe procedure with low perioperative complication rates.² Outcomes are considered highly satisfactory in the literature, particularly with regard to patency.³ As disadvantages, it is an invasive technique, and the most commonly used access route—the medial approach—may require sectioning of important structures such as tendons and muscles, which can complicate postoperative recovery. Additionally, it may not be definitive. There are reports of persistent



pressurization of the aneurysmal sac and aneurysm growth even after proximal and distal ligation due to retrograde flow from genicular branches.²

In the 20th century, with the introduction of endovascular techniques and, more specifically in 1994, Marin *et al.* defined a new milestone in the treatment of PAA after reporting the success of the first endovascular repair using an endoprosthesis.² Since then, with advances in medicine and particularly with the development of new devices, this technique has gained increasing importance and, in recent years, has been regarded as an alternative to conventional surgical treatment.³

Endovascular treatment consists of performing local or epidural anesthesia, with or without sedation, usually in the ipsilateral inguinal region to the PAA. In this region, antegrade puncture of the common femoral artery is preferably performed, although surgical exposure may also be used. Through the common femoral artery, the endoprosthesis is advanced to the target region and anchored proximally and distally to the lesion, thereby excluding the aneurysm.⁴⁻⁵

Despite the substantial increase in scientific output on the treatment of PAA over the past 10 years, there is no clear evidence suggesting superior outcomes between conventional surgical treatment and endovascular techniques.⁶ There is consensus among researchers regarding the need for further studies with longer follow-up periods.⁵ Large prospective studies are currently underway, such as the multicenter North American EPAR investigation. In Brazil, scientific production addressing this topic remains scarce. The importance of integrating the country into this context extends beyond inclusion as a scientific power—it fosters the development of new medical technologies and helps define better treatment options.

METHODOLOGY

A retrospective, descriptive, and analytical study conducted at Baía Sul Medical Center in the city of Florianópolis, Santa Catarina, Brazil, which included patients with a confirmed diagnosis of popliteal artery aneurysm (PAA) between December 2009 and December 2022.

RESULTS ANE DISCUSSION

In our study, 22 patients with a diagnosis of popliteal artery aneurysm (PAA) treated at Coris Vascular Medicine Clinic at Baía Sul Medical Center were identified. Of these patients, six were managed conservatively, three underwent conventional surgical treatment, and seven were treated using the endovascular approach. Six patients had no follow-up or outcome data available and were therefore excluded from the study.

The group of patients diagnosed with PAA who were managed conservatively consisted of six men with a mean age of 65.5 years. The risk factors most strongly associated with aneurysmal disease were systemic arterial hypertension (84.3%), smoking (41.2%), dyslipidemia (40.6%), and, to a lesser extent, obesity (29.8%). In this group, 44.9% of patients were classified as having high cardiovascular surgical risk.

On physical examination, increased pulsatility of the popliteal artery was detected in three patients, all of whom were asymptomatic. Absence of the popliteal pulse was observed in two cases; in one of these, the patient presented with clinical manifestations of rest pain, while the other was asymptomatic. Regarding distal pulse palpation, both the posterior tibial and dorsalis pedis pulses were present in five cases. In the two patients in whom these pulses were not palpable, the popliteal pulse was also absent.

Imaging studies performed in the conservatively treated group demonstrated PAAs with a mean diameter of 2.1 cm (range: 1.3–3.6 cm). Four aneurysms presented with mural thrombus, and two aneurysms were occluded. Regarding the number of patent leg arteries, the conservative treatment group included two patients with only one patent arterial vessel and five patients with two or more patent arterial vessels. Two cases presented with popliteal artery occlusion; one patient had rest pain, whereas the other was asymptomatic.

The group treated with conventional surgery consisted of three male patients with a mean age of 63.3 years. Systemic arterial hypertension, dyslipidemia, and smoking were the most prevalent risk factors and were present in combination in 75% of cases. In this group, 67% of patients were classified as having high cardiovascular risk.

Popliteal artery aneurysm (PAA) predominantly affects males, with a mean age of approximately 65 years. Its main etiological factor is atherosclerosis, and patients

typically present with multiple associated risk factors.⁶ In a study involving 137 patients, Pulli *et al.* demonstrated that systemic arterial hypertension was present in 54.7% of cases, 44.5% of patients had dyslipidemia, 6.6% had diabetes mellitus, and 70.8% had a history of smoking.⁷ Similarly, in our study, 94.7% of participants were male, with only one female patient.

According to the literature, PAAs are bilateral in up to 50% of cases.² Ronchey *et al.*, studying 67 patients, found bilateral involvement in 51% of cases, whereas in the cohort of 137 patients studied by Pulli *et al.*, 16.6% of PAAs were bilateral.⁸ In our sample, the results were closer to those reported by Pulli *et al.*, with 10.5% of PAAs being bilateral, all of which occurred exclusively in the conventional surgery group. This discrepancy in relation to the literature is likely attributable to the small sample size of our study.

The literature indicates that approximately 80% of PAAs are asymptomatic at the time of diagnosis.⁸ In our sample, 42.1% of patients reported no symptoms, which differs from several published studies. Typically, the initial symptoms result from ischemic disease caused by embolization or thrombosis of the PAA.⁵

Most authors currently advocate early treatment of PAA,⁹ while others recommend that asymptomatic patients with aneurysms smaller than 2 cm in diameter and without thrombus may be managed conservatively, with risk factor control and serial imaging follow-up.⁴ The indication for conventional or endovascular surgery appears to be well established for patients with PAAs larger than 2 cm in diameter, with the presence of mural thrombus, or who are symptomatic.⁹

Another important aspect is cardiovascular risk stratification. According to some studies, endovascular treatment may be more appropriate for patients at high surgical risk, as it is a less invasive procedure and is associated with a shorter postoperative hospital stay compared with conventional surgery.⁵ In line with this, our sample showed a greater tendency for high cardiovascular risk patients to be treated with the endovascular technique. In this group, 75% of patients were classified as high surgical risk, compared with 42.8% in the conservative treatment group and 59% in the conventional surgery group.

Regarding outcomes, early case series comparing conventional surgical



treatment with endovascular techniques demonstrated inferior results for endovascular procedures, with high rates of complications and limb loss.¹⁰ With technological advances, refinement of endovascular techniques, and improvements in devices, endovascular treatment has shown progressively better outcomes.¹¹ Currently, several literature reviews and case series demonstrate good patency rates and comparable limb salvage rates between these two techniques.³

The statistical analyses performed in our study did not identify statistically significant associations among the analyzed parameters. This lack of statistical significance may be attributed to the small sample size. Therefore, future studies with larger patient cohorts are necessary.

FINAL CONSIDERATIONS

Systemic arterial hypertension was the most strongly associated risk factor. A tendency was observed for older patients with high cardiovascular risk and acute ischemia to be directed toward endovascular treatment. A conservative approach was also more frequently adopted for asymptomatic popliteal artery aneurysms with small diameter (≤ 2.5 cm), yielding favorable outcomes. Length of hospital stay did not differ significantly between the conventional surgical and endovascular treatment groups.

REFERENCES

1. Villaseñor L de la Garza. Aneurysms through time. *Cirurgano General*. 2009;22(3):264–271. Available at: <https://www.medigraphic.com/pdfs/cirgen/cg-2000/cg003n.pdf>
2. Galland RB. Popliteal aneurysms: from John Hunter to the 21st century. *Ann R Coll Surg Engl*. 2007;89(5):466–471. Available at: PubMed PMID: 17688716.
3. Schechter DC, Bergan JJ. Popliteal aneurysm: a celebration of the bicentennial of John Hunter's operation. *Ann Vasc Surg*. 1986;1:118–126. doi:10.1007/BF02732465
4. Brito CJ, Schulze GC, Loureiro E. Lower limb aneurysms. In: Brito CJ, Duque A, Merlo I, Murilo R, Filho VL, editors. *Vascular Surgery – Endovascular Surgery – Angiology*. 2nd ed. Rio de Janeiro: Revinter; 2008. p. 610–627.



5. Raschcowetzki AM, Galego GN, Silveira PG. Evaluation of endovascular treatment of popliteal artery aneurysm. Undergraduate thesis (MD). Florianópolis: Federal University of Santa Catarina; 2009.
6. Locks GF, Oliveira Filho GR, Roesler CRM. *In vitro evaluation of connections of devices used in the repair of popliteal artery aneurysm*. Doctoral dissertation (PhD). Florianópolis: Federal University of Santa Catarina; 2020.
7. Aragão JA, Miranda FGG, Sant'Anna Aragão IC, Sant'Anna Aragão FM, Reis FP. Treatment of bilateral popliteal artery aneurysm. *J Vasc Bras*. 2020;19:e20180142. doi:10.1590/1677-5449.180142
8. Gonçalves AFF, et al. Comparison between open and endovascular surgery in the treatment of popliteal artery aneurysm: a review. *J Vasc Bras*. 2018;17(1):42–48. Available at: <https://www.jvascbras.org/article/10.1590/1677-5449.008817/pdf/jvb-17-1-42.pdf>
9. Bandeira RN, et al. Endovascular versus open treatment of popliteal artery aneurysm: a review article. *J Vasc Bras*. 2018;17(1):34–41. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5990263/>
10. Oliveira RSM, et al. Rupture of popliteal artery aneurysm: case report and review of the literature of the last 50 years. *J Vasc Bras*. 2015;14(1):105–110. Available at: <https://app.periodikos.com.br/article/5df255360e8825bb35b5f733/pdf/jvb-4-1-105.pdf>
11. Pulli R, et al. Surgical management of popliteal artery aneurysms: which factors affect outcomes? *J Vasc Surg*. 2006;43(3):481–488. Available at: <https://www.jvascsurg.org/action/showPdf?pii=S074152140502077X>