

Dorsalis Pedis Artery Aneurysm: an Ultrasound Diagnosis

Ana Claudia Gomes Pereira Petisco,^{1,2} Larissa Chaves Nunes Carvalho,¹ Mohamed Hassan Saleh,¹ Fabio Henrique Rossi,¹ Marcela da Silva Dourado,¹ Juliana Chen,¹ Heraldo Antonio Barbato,¹ Andrea de Andrade Vilela¹

Instituto Dante Pazzanese de Cardiologia,¹ São Paulo, SP – Brazil

Clínica Procuração Cardiologia Preventiva – Ecocardiografia,² São Paulo, SP – Brazil

Dorsalis Pedis Artery Aneurysms (DPAA) are rare, and few cases have been described in the literature. Pseudoaneurysms are believed to be more common than true aneurysms, but little is known about their clinical behavior.¹ The present study shows a case report of a patient with a DPAA, diagnosed by vascular ultrasound (VUS) and surgically treated at our facility.

We treated a 59-year-old female patient, who was a saleswoman. She was asymptomatic until one year ago, when she noticed the appearance of a pulsatile mass on the dorsum of her right foot, which was occasionally painful, especially when wearing closed-toe shoes. She reported trauma five years prior to the onset of symptoms, caused by an iron bar falling on her feet.

Medical History: hypertension, diabetes mellitus, and dyslipidemia.

At the time of treatment, she was continuously taking simvastatin, metformin, and losartan. Physical examination was normal, except for the presence of a pulsatile mass on the dorsum of the right foot, varicose veins, and ochre dermatitis on both lower limbs. BP: 120X85 mmHg; HR=76 bpm.

Laboratory tests, an electrocardiogram, chest X-ray, and transthoracic echocardiogram were performed, all of which were normal.

The VUS of the arteries of the right lower limb showed an image suggestive of a fusiform aneurysm of the right DPAA, with thrombi measuring approximately 1.9 cm x 0.7 cm. Flow was present and multiphasic. Other arteries of the right lower limb showed flow to be present and multiphasic, without stenosis or other dilations (Figure 1).

An arteriography of the lower right limb demonstrated saccular dilation of the DPAA, near the metatarsal branches, with a maximum diameter of 1.0 cm. Arteriography suggested the diagnosis of a pseudoaneurysm (Figure 2).

Keywords

Dorsalis pedis artery aneurysm; Doppler ultrasonography; Vascular ultrasonography; Surgery; Dorsalis pedis artery

Mailing Address: Ana Claudia Gomes Pereira Petisco •

Instituto Dante Pazzanese de Cardiologia – Ecocardiografia. Rua Dr. Dante Pazzanese, 500. Postal Code: 04012-909, São Paulo, SP – Brasil
E-mail: anapetisco@outlook.com

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The patient underwent open surgery, and the intraoperative findings, upon opening the aneurysm sac, showed no evidence of a pseudoaneurysm orifice; however, evidence of a true aneurysm was observed.

An end-to-end graft with an inverted great saphenous vein was performed, preserving the arterial flow.

The patient was discharged the following day after a control ultrasound demonstrated preserved, multiphasic flow in the dorsal artery of the right foot (Figure 3).

Discussion

The DPAA (pedal artery) was first described in 1907.² Since then, other authors have reported this rare type of aneurysm, but its clinical manifestations are still relatively unknown.¹ With only 24 cases reported in the literature until 2017, according to Aragão et al.,¹ the DPAA aneurysm is more common among men (63%) with a mean age of 55.4%.³ In general, it appears as a pulsatile mass, which may lead to microembolization, hemorrhage, rupture, and nerve compression.⁴ Physical examination usually reveals a pulsatile mass that can cause pain, paresthesia, and discomfort when walking or wearing shoes, complaints similar to the case reported in our study.⁵

The pathophysiology of these aneurysms is still uncertain, but it appears to be related to two types of mechanisms: an intrinsic mechanism, related to weakness in the vessel wall structure, such as collagen diseases, Marfan and Ehlers-Danlos syndromes, syphilis, diabetes, infections, trauma, atherosclerosis, and fibrodysplasia; and an extrinsic mechanism, caused by mechanical stress on the arterial wall, such as trauma.³⁻⁶ However, according to the literature, many DPAA are pseudoaneurysms and occur after trauma or iatrogenic injuries secondary to orthopedic or vascular procedures.¹ Although trauma is a cause of DPAA, patients are often unable to remember the acute event, and symptoms arise when they experience a compression of local structures or specific events, including embolism or rupture.⁵ There have also been cases of repeated, low-impact trauma that have led to aneurysmal degeneration, such as tight shoes in patients with congenitally markedly high arches.⁵

True aneurysms appear with all three layers of the arterial wall, while pseudoaneurysms refer to hematomas with flow resulting from a rupture of the vessel wall.^{6,7} In our case, contrast angiography diagnosed the dilation as a pseudoaneurysm, but the VUS characteristics were those of a true DPAA with mural thrombus, which proved to be consistent with the surgical finding, which also presented as a true DPAA. Other authors have described a similar

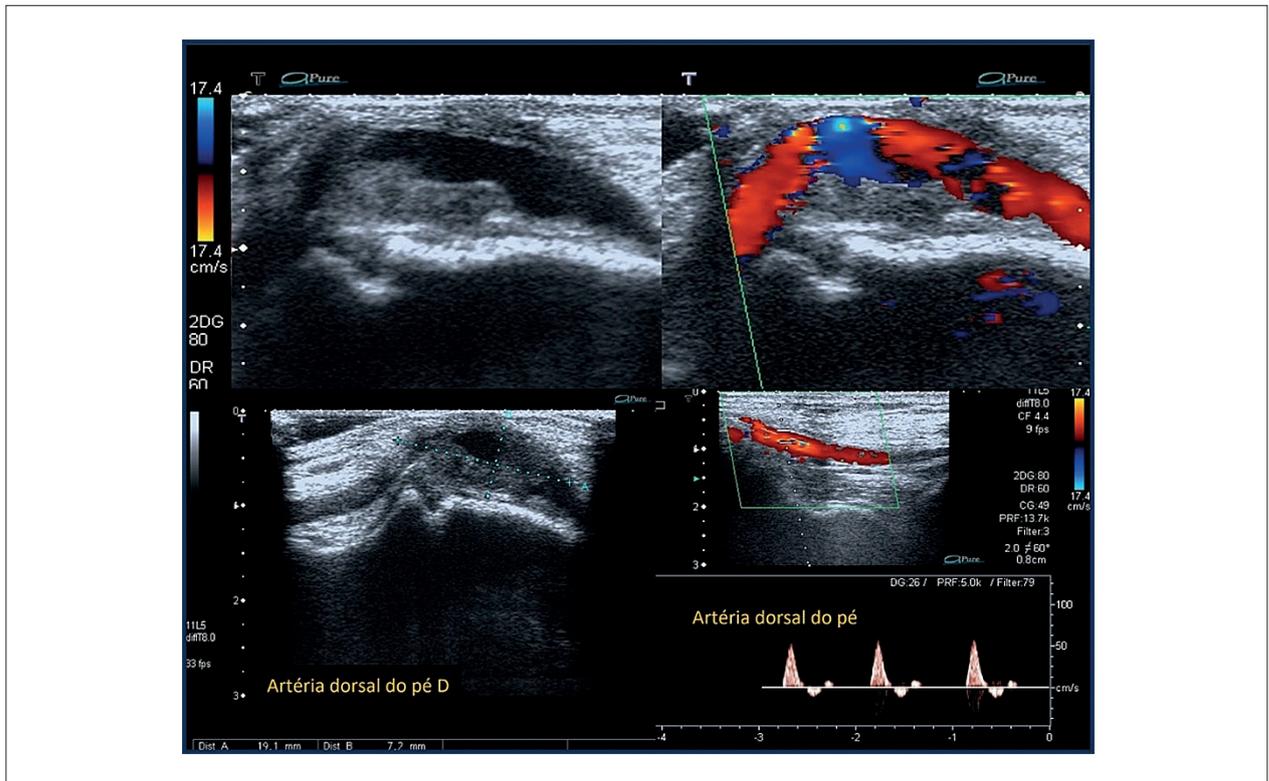


Figure 1 – Dorsalis Pedis Artery Aneurysms (DPAA) of the foot. A and B: Two-dimensional and color Doppler ultrasound images demonstrate arterial patency and the presence of thrombi; C: aneurysm measurements; D: Multiphasic flow before dilation on spectral Doppler.

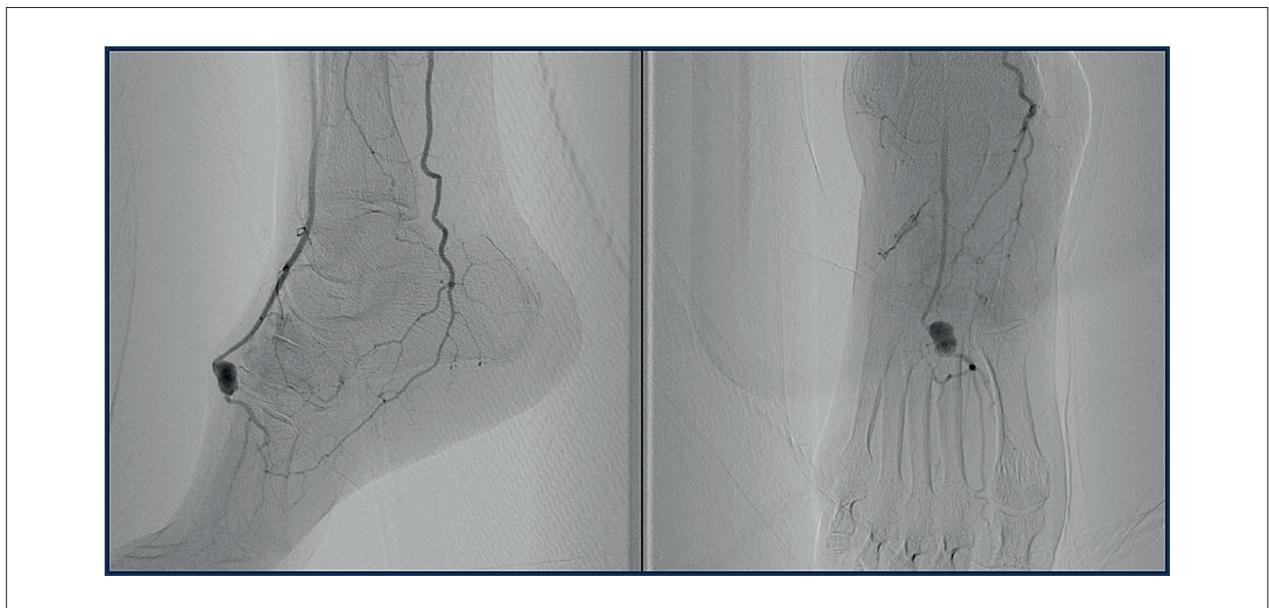


Figure 2 – A and B: arteriography demonstrating saccular dilation of the dorsalis pedis artery.

situation, and in some cases, only histopathological examination can differentiate between pseudoaneurysms and true DPAA.^{5,6,8}

Diagnosis must be made promptly to avoid complications, such as thrombosis, distal embolism, hemorrhage, and rupture.¹ In a review by Kato et al.,³ 4% of infrapopliteal

Case Report

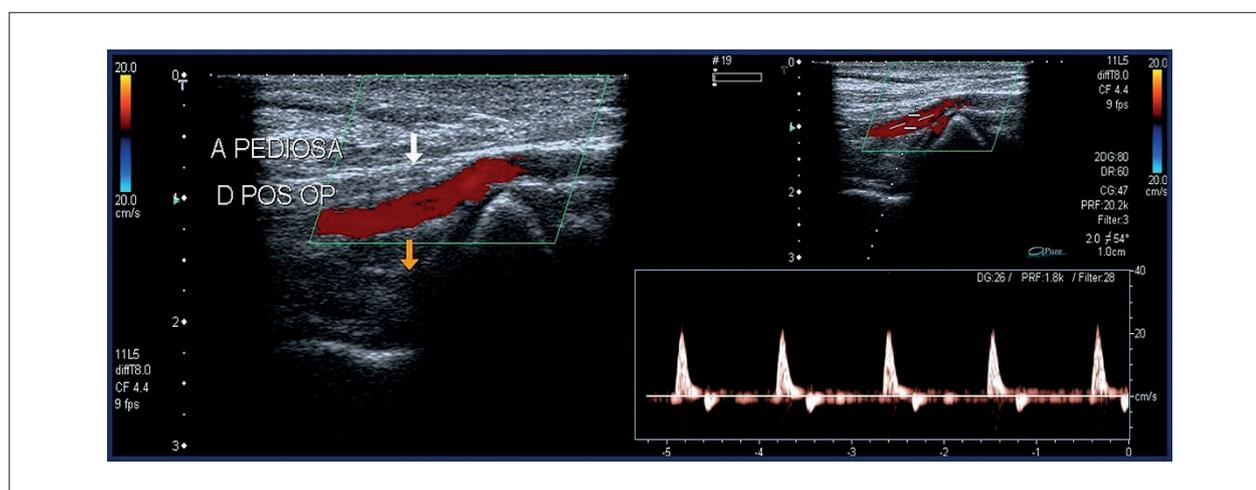


Figure 3 – Postoperative control ultrasound. A: absence of aneurysm and arterial patency with preserved flow on color Doppler; B: multiphasic flow in the dorsalis pedis artery via spectral Doppler.

aneurysms progress to rupture and 12.5% to thrombosis. VUS should be the first diagnostic test performed due to its high sensitivity and specificity in detecting aneurysms and pseudoaneurysms, as well as its noninvasive nature and lack of iodinated contrast.⁷ However, other tests, such as computed tomography, conventional angiography, or magnetic resonance imaging, may also be performed for further diagnostic investigation or in doubtful cases.⁹ The diagnostic investigation is usually similar in patients with pseudoaneurysms and true DPAA.⁹ Our patient initially underwent vascular ultrasonography, which diagnosed the DPAA, and conventional arteriography was subsequently performed to demonstrate the arterial arch and better evaluate other vascular structures.

Treatment of a DPAA should be tailored to the individual case, with the options being endovascular or open surgical treatment.⁹ Open surgical methods include simple ligation with or without resection, reconstruction of the artery with primary anastomosis, or interposition of a vein graft.^{4,6,9,10} In the present case, an end-to-end graft with an inverted great saphenous vein and preservation of arterial flow were performed. The patient is currently asymptomatic and is being treated through outpatient follow-up.

Author Contributions

Conception and design of the research: Petisco ACGP, Saleh MH. Acquisition of data: Petisco ACGP, Carvalho LCN, Rossi FH, Dourado MS, Barbato HA, Chen J. Analysis and interpretation of the data: Petisco ACGP, Carvalho LCN, Saleh MH, Dourado MS, Barbato HA, Chen J. Writing of the manuscript: Petisco ACGP, Carvalho LCN, Saleh MH, Dourado MS. Critical revision of the manuscript

for intellectual content: Petisco ACGP, Saleh MH, Rossi FH, Vilela AA.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Study Association

This study is not associated with any thesis or dissertation work.

Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of the Instituto Dante Pazzanese de Cardiologia under protocol number CAAE: 94268925.3.0000.5462, opinion 8.052.126. All procedures involved in this study are in accordance with the Declaration of Helsinki of 1975, updated in 2013.

Use of Artificial Intelligence

The authors did not use any artificial intelligence tools in the development of this work.

Availability of Research Data

The underlying content of the research text is contained within the manuscript.

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