



Case Report

Popliteal entrapment syndrome: case report and surgical technique review

Síndrome de atrapamiento poplíteo: caso clínico y revisión de la técnica quirúrgica

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Abstract

Introduction: popliteal artery entrapment syndrome (PAES) is due to an abnormal relationship between the popliteal artery and the surrounding structures in the popliteal fossa.

Case report: the objective of this study is to present the case of a young man diagnosed with symptomatic type II PAES who was successfully treated via posterior approach to the popliteal artery, myotomy of the medial head of the gastrocnemius muscle and, ultimately, an endarterectomy of the popliteal artery and closure with a small saphenous vein patch.

Discussion: PAES is a rare and underdiagnosed condition. Early diagnosis and surgical treatment can influence the prognosis of the limb in young patients.

Keywords:

Popliteal artery entrapment. Arterial occlusive diseases. Limb salvage.

Resumen

Introducción: el síndrome de atrapamiento de la arteria poplíteo (SAAP) se debe a una relación anómala entre la arteria poplíteo y las estructuras que la rodean en la fosa poplíteo.

Caso clínico: el objetivo de este trabajo es presentar el caso de un paciente varón joven diagnosticado de un SAAP de tipo II sintomático que es tratado satisfactoriamente mediante abordaje posterior de la arteria poplíteo, miotomía de la cabeza medial del músculo gastrocnemio y, posteriormente, una endarterectomía de la arteria poplíteo y cierre con parche de la vena safena menor.

Discusión: el SAAP es una condición infrecuente e infradiagnosticada. El diagnóstico y tratamiento quirúrgico precoz puede influir en el pronóstico de la extremidad en pacientes jóvenes.

Palabras clave:

Atrapamiento arteria poplíteo. Enfermedad arterial oclusiva. Salvamento de la extremidad.

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INTRODUCTION

Popliteal artery entrapment syndrome (PAES) is a rare condition resulting from an abnormal relationship between the popliteal artery and the musculotendinous structures of the popliteal fossa. Missing out on its diagnosis can compromise the prognosis of the affected limb. Surgical treatment is essential and involves the release of the popliteal artery, sometimes requiring its revascularization.

CASE REPORT

A 21-year-old man with no past medical history presented with pain in the left lower limb during exercise, localized at the calf and toes, associated with color changes and coldness. Physical examination revealed pulses at all levels; however, passive dorsiflexion of the foot showed a decrease in the amplitude of distal pulses. An arterial Doppler ultrasound showed a chronic parietal thrombus causing < 50 % stenosis. Consequently, an MR angiography (MRA) was performed, revealing an aberrant lateral insertion of the medial head of the gastrocnemius muscle at femoral level and medial deviation of the popliteal artery, which was consistent with a type II PAES (Fig. 1). The patient had the same anatomical variant contralaterally. Given the diagnosis of symptomatic type II PAES with arterial lesion, surgical treatment was decided through myotomy of the medial head of the gastrocnemius followed by the revascularization of the popliteal artery. The patient underwent scheduled surgery under general anesthesia. In the prone position, a posterior S-shaped approach to the popliteal fossa was attempted. The small saphenous vein, tibial nerve, popliteal artery, and medial head of the gastrocnemius were dissected and identified. The medial head was dissected to its supracondylar origin on the femur (Fig. 2A) and then sectioned at the insertion (Fig. 2B). Subsequently, an endarterectomy of the popliteal artery was performed (Fig. 2C) and closed with a patch of the small saphenous vein (Fig. 2D). The postoperative period was uneventful, and the patient was discharged after 5 days at the hospital. Upon discharge, he was put on a 1-month regimen of 100 mg of acetylsalicylic acid and 40 mg

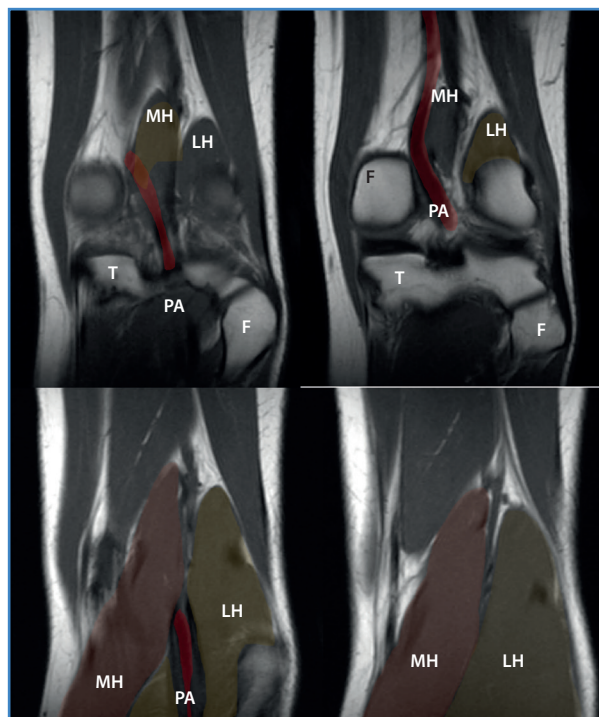


Figure 1. MRA. Anteroposterior view of the knee. MH: medial head of the gastrocnemius muscle; LH: lateral head of the gastrocnemius muscle; F: femur; T: tibia; F: fibula; PA: popliteal artery.

of enoxaparin every 24 hours, with indefinite single antiplatelet therapy. During follow-up (currently 1 year), the patient remains asymptomatic and is pending surgical intervention of the contralateral limb.

DISCUSSION

PAES is a rare condition with incidence rates between 0.17 % and 3.5 % (1), which results from an abnormal relationship between the popliteal artery and the surrounding musculotendinous structures in the popliteal fossa (1-3). Its diagnosis is challenging due to the atypical patient profile (young, athletic, and healthy) with chronic ischemia threatening the limb. Early diagnosis is crucial as compression can cause irreversible damage to the popliteal artery (3).

PAES is often categorized into 6 types according to the Whelan-Rich classification (3-5).

1. Type I PAES (8.6 %): abnormal course of the popliteal artery medial to the medial head of the gastrocnemius with normal insertion.

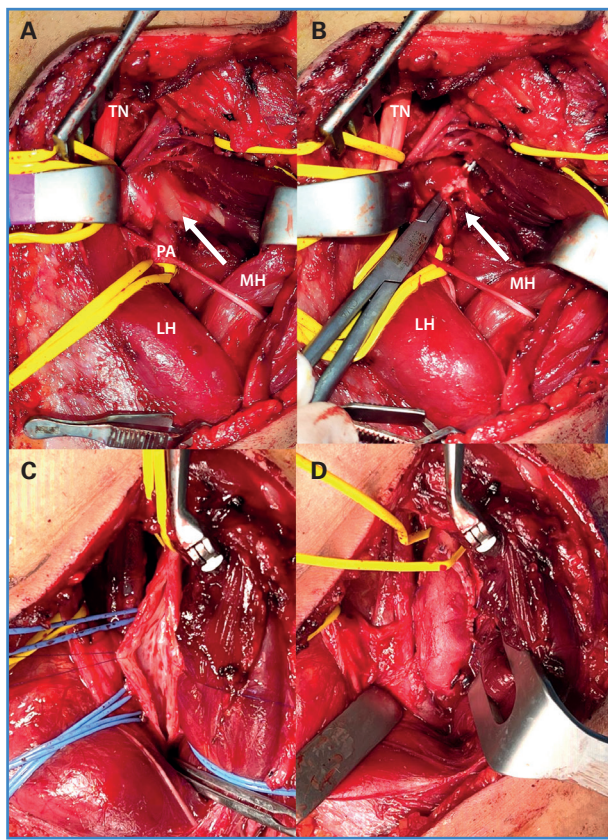


Figure 2. Posterior approach to the popliteal artery. A. Arrow: tendonous insertion. B. Myotomy of the medial head of the gastrocnemius. C. Arteriotomy of the popliteal artery. D. Patch angioplasty with the small saphenous vein. MH, medial head of the gastrocnemius; LH, lateral head of the gastrocnemius; PA, popliteal artery; TN, tibial nerve.

2. Type II PAES (67.2 %): abnormal course of the popliteal artery medial to the medial head of the gastrocnemius with abnormal more lateral femoral insertion.
3. Type III PAES (15.5 %): compression of the popliteal artery by an accessory band of the medial head of the gastrocnemius inserting laterally and independently.
4. Type IV PAES (6.9 %): abnormal position of the popliteal artery, deep to the popliteus muscle underneath fibrous bands in the popliteal fossa.
5. Type V PAES (1.7 %): any entrapment involving the popliteal vein.
6. Type VI PAES (< 1 %): no abnormalities in the arterial course or gastrocnemius insertions, functional compression of the popliteal artery.

PAES is more common in men (80 %), young adults (20-40 years), with a 30 % bilateral association. Symp-

toms vary according to the degree of neurovascular compression, the most common being intermittent claudication (90 %), while only 5 % exhibit rest pain at diagnosis (4,5). Dorsiflexion and plantar flexion maneuvers that compress the popliteal artery can be useful for early diagnosis (6). Finding a lesion (stenosis or thrombosis) in the popliteal artery in young patients requires considering the diagnosis of PAES. Currently, MRA is considered the diagnostic imaging modality of choice to assess the relationship between the popliteal artery and the surrounding musculotendinous structures (1).

Surgical intervention is indicated in symptomatic cases, including the release of the popliteal artery and, conditionally, its revascularization. It is generally performed through a posterior approach, allowing access to the entire length of the popliteal artery (4,7). The incision is S-shaped, with the upper trace medial and the lower trace lateral. The first structure that should be identified is the small saphenous vein, which can be used as a venous graft or should be ligated to avoid injury. The deep fascia is opened vertically to facilitate its subsequent closure. The tibial and peroneal nerves are then identified. The tibial nerve is the most superficial structure in the midline of the popliteal fossa, followed by the peroneal nerve, which is more lateral. The popliteal artery and vein are located medial to the tibial nerve. A useful technique to identify the popliteal vessels is to follow the small saphenous vein to its drainage into the popliteal vein. The artery is medial and deeper than the popliteal vein. To perform the myotomy, the medial head of the gastrocnemius is identified and followed to its insertion at the supracondylar level of the femur. During the myotomy, the popliteal vessels must be protected, which should be accomplished through proximal and distal monitorization of the popliteal artery. In cases in which there is an arterial lesion, revascularization should be considered (1,4,5,8). If the popliteal artery is patent, endarterectomy with patch angioplasty can be considered, while in cases of arterial occlusion, a bypass should be considered (1,4,8). PAES is a rare condition, but knowledge of it is essential for early diagnosis and treatment. Missing this entity can lead to irreversible consequences for the limb in a young patient.

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