ISSN (electrónico): 1695-2987 - ISSN (papel): 0003-3170

Angiología

Case Report

Ultrasound-guided thrombin injection of iatrogenic popliteal pseudoaneurysm

Punción ecoguiada de trombina de pseudoaneurisma poplíteo yatrogénico

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Abstract

Introduction: popliteal artery injury in a knee arthroscopy has an incidence < 0.01 %. A popliteal pseudoaneurysm is a rare complication. Ultrasound-guided thrombin injection (UGTI) has shown great results in treating femoral artery pseudoaneurysms. This is the reason why this technique is being performed in other locations such as brachial or radial arteries. However, UGTI has barely been reported in popliteal artery.

Case report: we report the case of a 66 years-old-woman with a popliteal pseudoaneurysm secondary to a knee arthroscopy. It was successfully treated with UGTI, achieving pseudoaneurysm thrombosis, a decreased size, and an improvement of the symptoms with no complications.

Discussion: endovascular and open surgery are alternative treatments. Open surgery can be helpful when complications occur or hematoma evacuation is required, and endovascular treatment is a good choice in the case of high-risk comorbidities and reduced life expectancy.

Keywords:
Popliteal artery.
Pseudoaneurysm.
Iatrogenic disease.

Resumen

Introducción: la lesión de la arteria poplítea en una artroscopia de rodilla tiene una incidencia inferior al 0,01 %; el pseudoaneurisma poplíteo es una complicación anecdótica. La punción ecoguiada de trombina ha mostrado grandes resultados en el tratamiento de pseudoaneurismas femorales. Por ello, esta técnica está realizándose en otras localizaciones, como las arterias braquial y radial. Sin embargo, la punción ecoguiada de trombina apenas se ha reportado a nivel de la arteria poplítea.

Caso clínico: presentamos el caso de una mujer de 66 años con un pseudoaneurisma poplíteo secundario a una artroscopia. Fue exitosamente tratado con punción ecoguiada de trombina, con lo que se consiguió la trombosis del pseudoaneurisma, la disminución de su tamaño y la mejoría de los síntomas sin complicaciones.

Discusión: el tratamiento endovascular y la cirugía abierta son tratamientos alternativos. La cirugía abierta puede ser útil cuando hay complicaciones o se precisa evacuar el hematoma, y la cirugía endovascular es una buena elección en el caso de pacientes de alto riesgo y con esperanza de vida limitada.

Palabras clave:
Arteria poplítea.
Pseudoaneurisma.
Iatrogenia.

Received: 09/01/2023 • Accepted: 09/30/2023

Conflicts of interest: the authors declared no conflicts of interest.

Artificial intelligence: the authors declare that they did not used any artificial intelligence (AI) or AI-assisted technologies to write this the article.

Pastor Alconchel L, García Nieto B, Hidalgo Iranzo N, Álvarez Gómez J, Fernández-Aguilar Pastor AC. Ultrasound-guided thrombin injection of iatrogenic popliteal pseudoaneurysm. Angiologia 2024;76(3):178-181

DOI: http://dx.doi.org/10.20960/angiologia.00569

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INTRODUCTION

An arterial pseudoaneurysm is a locally contained hematoma resulting from the rupture of the arterial wall. The connective tissue surrounding the hematoma creates a capsule-like wall, which prevents active bleeding.

Knee arthroscopy is a safe procedure. In over 300,000 knee arthroscopies, the incidence of popliteal artery injury was < 0.01 % (1).

CASE REPORT

A 66-year-old woman with a history of hypertension, obesity, type II diabetes mellitus, and fibromyalgia underwent synovectomy with debridement and meniscal suture for instability of the left internal meniscus 2 weeks prior, receiving prophylactic enoxaparin treatment since then.

She presented to the ER with edema, pain, and difficulty walking in the operated limb. She had visited the ER 7 days earlier with the same symptoms and was diagnosed with a Baker's cyst by ultrasound. She returned due to lack of improvement. On examination, she had edema and hematoma from mid-thigh to toe roots and a painful pulsatile mass in the popliteal fossa; she had pulses at all levels with good distal perfusion and preserved mobility and sensation.

An ultrasound-Doppler was performed, revealing a 50 mm × 30 mm sac-like dilatation adjacent to the popliteal artery, with flow inside showing the ying-yang sign, suggesting a pseudoaneurysm. A coronary computed tomography angiography (CCTA) confirmed a 40 mm pseudoaneurysm of the popliteal artery and located the arterial rupture at the second portion of the popliteal artery (Fig. 1).

Due to her obesity, extensive hematoma in the popliteal fossa, pseudoaneurysm location, and a short, narrow neck, we decided to perform an ultrasound-guided thrombin injection.

Under local anesthesia and in the prone position, a Seldinger needle puncture was performed. When the needle tip was visualized at the pseudoaneurysm sac and pulsatile reflux was obtained, 4 cm^3 of thrombin (Floseal®, Baxter) were injected slowly.

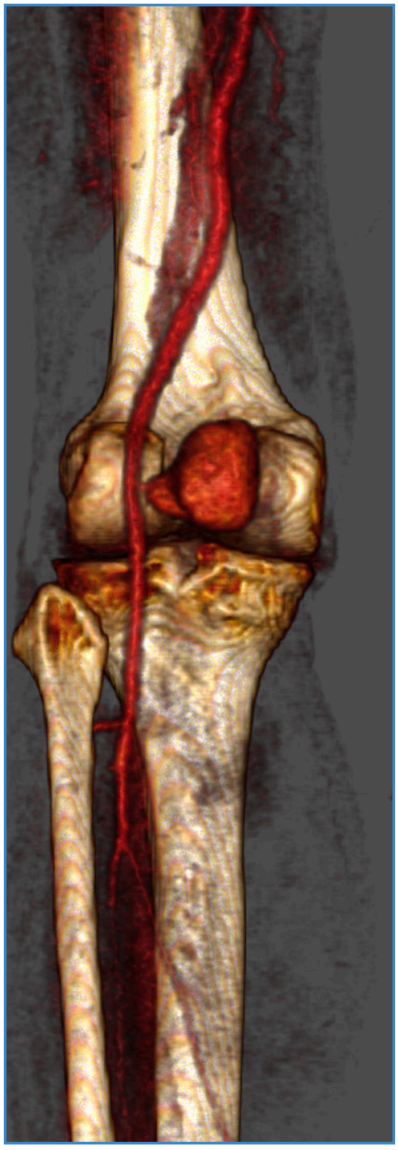

Figure 1. *Coronary computed tomography angiography showing a large popliteal pseudoaneurysm with a small, narrow neck located in the 2nd portion of the popliteal artery.*

Simultaneously, we compressed the pseudoaneurysm neck under ultrasound guidance to minimize the risk of thrombin embolization and monitored artery patency with color Doppler function.

Once pseudoaneurysm thrombosis was confirmed (Fig. 2), the patient was kept at complete rest with local compression.

A follow-up Doppler ultrasound performed at 24 hours confirmed pseudoaneurysm thrombosis with a 10 mm decrease in size. The patient was discharged with reduced pain in the popliteal fossa and adequate distal perfusion, without complications at the puncture site.

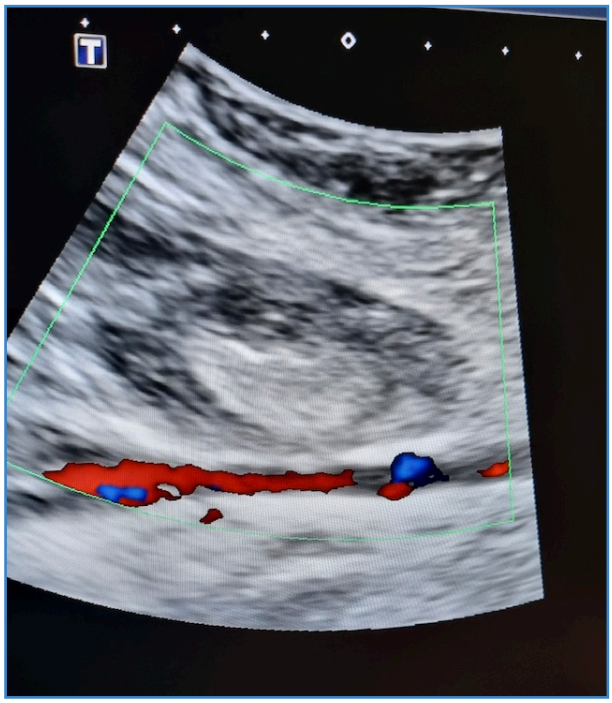

Figure 2. *Ultrasound image showing thrombosed popliteal pseudoaneurysm and patency of the popliteal artery.*

DISCUSSION

Vascular injuries in orthopedic surgery result from direct arterial trauma during surgery or from traction or plaque fracture during ischemia (2).

Popliteal pseudoaneurysm should be suspected in the presence of a painful pulsatile mass in the popliteal fossa. The most typical symptoms and signs (3) include pain, swelling, bruising, sensory or motor alterations, and decreased or absent peripheral pulses, potentially leading to gait impairment due to neurological deficit (2).

Its progressive expansion can lead to complications (3) such as skin necrosis, distal embolism, acute ischemia, or rupture, which could result in limb amputation.

Upon initial suspicion, an ultrasound-Doppler or CCTA should be performed for confirmation purposes. Patients with small pseudoaneurysms (< 2 cm) may undergo expectant management due to the possibility of spontaneous thrombosis (4).

Ultrasound-guided compression emerged as a non-invasive treatment decades ago. It involves increasing direct pressure on the pseudoaneurysm neck under ultrasound surveillance until flow within the sac ceases, promoting thrombosis. In 2016, a systematic review estimated the success rate of this technique at 69 % (5), which varies depending on the pseudoaneurysm size. This technique can be very uncomfortable for the patient and may even lead to pseudoaneurysm rupture.

Therefore, it has gradually been replaced by ultrasound-guided thrombin injection, which has demonstrated sac thrombosis rates of 91 % up to 100 % in locations such as the femoral or humeral artery (3,6). The rate of complications stands at around 1.3 %; embolic events account for only 0.5 % (7).

Open surgery facilitates hematoma evacuation and direct repair of the injured artery (direct suture, patch plasty, or venous graft interposition). While it is true that 0pen surgery has shown higher technical success (8), it does so at the expense of increasing the number of complications (surgical wound dehiscence, infection, or nerve injury) (8) and the risk of reintervention (9), longer lengths of stay, and procedural time (9). Therefore, this technique is currently recommended only in case of failed ultrasound-guided puncture or acute complications such as compartment syndrome, acute ischemia, or hemodynamic instability (8,9).

Finally, endovascular exclusion is considered an appropriate treatment option, but its risks depend on the location of the pseudoaneurysm. Although the patency of the popliteal stent appears to be acceptable even under repeated and extreme knee flexion, long-term results are scarce (10). Therefore, endovascular exclusion should be spared for older patients with high-risk comorbidities and limited life expectancy (10).

This is the second case ever reported of ultrasound-guided thrombin injection for a popliteal pseudoaneurysm. We demonstrate that this technique is quick, safe, and effective for closing this type of pseudoaneurysm, avoiding neurological damage and surgical wound infection that would favor open surgery and stent thrombosis in endovascular treatment. In our case, we avoided open surgery due to the high risk of complications associated with obesi-

ty and the large volume of hematoma in this patient. The endovascular option was ruled out because the second portion of the popliteal artery was involved in an active woman.

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