Anterior Tibial Artery Pseudoaneurysm as a Complication of Anterior Ankle Arthroscopy: A Case Report

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ABSTRACT
We present the case of an anterior tibial artery pseudoaneurysm as a complication following anterior ankle arthroscopy. This complication is extremely rare and represents a therapeutic challenge. A patient developed progressively worsening pain, limited dorsiflexion, local swelling, and gait claudication two weeks after undergoing anterior ankle arthroscopy for anterior impingement syndrome and an osteochondral lesion, without signs or symptoms of infection. Magnetic resonance imaging (MRI) and ultrasound established the diagnosis of an anterior tibial artery pseudoaneurysm. Treatment consisted of thrombin injection followed by microcoil embolization under angiographic guidance. The outcome was favorable, with resolution of pain, successful treatment of the pseudoaneurysm, and recovery of ankle mobility. **Conclusions:** Clinical suspicion is essential in patients presenting with disproportionate pain, swelling, or a pulsatile mass. Early diagnosis and treatment are associated with a better prognosis.
Keywords: Pseudoaneurysm; ankle; arthroscopy.
Level of Evidence: IV

Seudoaneurisma de la arteria tibial anterior como complicación de una artroscopia anterior de tobillo. Presentación de un caso

RESUMEN
Se presenta un caso clínico de un seudoaneurisma de la arteria tibial anterior como complicación luego de una artroscopia anterior de tobillo. Esta complicación es extremadamente infrecuente y supone un desafío terapéutico. Se trata de un paciente que, a las 2 semanas de la artroscopia anterior de tobillo por un síndrome friccional anterior y una lesión osteocondral, comienza con dolor creciente, limitación de la dorsiflexión, edema local y claudicación de la marcha, sin signos ni síntomas de infección. Con una resonancia magnética y una ecografía, se diagnosticó un seudoaneurisma de la arteria tibial anterior, que se trató con una inyección de trombina y la posterior embolización con un *microcoil* bajo guía angiográfica. La evolución fue favorable, el dolor desapareció, el seudoaneurisma fue tratado, con éxito, y el paciente recuperó la movilidad del tobillo. **Conclusiones:** Es imprescindible la sospecha clínica ante un paciente con dolor desproporcionado, edema o una masa pulsátil. El diagnóstico y el tratamiento tempranos permiten un mejor pronóstico.
Palabras clave: Seudoaneurisma; artroscopia; tobillo.
Nivel de Evidencia: IV

INTRODUCTION

Pseudoaneurysms are generally caused by disruption of all three layers of the arterial wall. They are most commonly iatrogenic in origin, although they may also occur following trauma.[1] Unlike true aneurysms, their wall is composed of fibrous tissue rather than the normal arterial wall layers, making them more prone to rupture.

The reported complication rate following ankle arthroscopy ranges from 3.5% to 17%. Most complications are minor and transient, with dysesthesia or paresthesia involving the superficial peroneal nerve being the most frequently reported.[2-5]

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CLINICAL CASE

A 36-year-old man with no relevant medical history presented with chronic pain in his left ankle. He reported sustaining an ankle sprain 3 years earlier, after which he continued to experience anterolateral ankle pain that prevented him from participating in recreational sports activities. He underwent multiple courses of physical therapy without significant improvement. At the preoperative evaluation, his main complaint was moderate anterolateral pain in the left ankle at rest, which worsened with activity and weight-bearing.

Clinical Findings

On initial physical examination, ankle alignment and ligamentous stability were preserved. No obvious swelling was present. Tenderness was noted over the anterolateral aspect of the ankle joint, particularly in the region of the anterior talofibular ligament and the anterior inferior tibiofibular ligament (Bassett's ligament). Forced ankle dorsiflexion reproduced marked pain in the anterolateral region, suggesting anterior ankle impingement. The patient also reported intra-articular pain during axial loading.

Diagnostic Evaluation

Preoperative imaging studies

Computed tomography: Osteochondral lesion of the lateral talar shoulder measuring 7.8 x 4.0 mm. Calcifications within the anterior talofibular ligament (Figure 1).

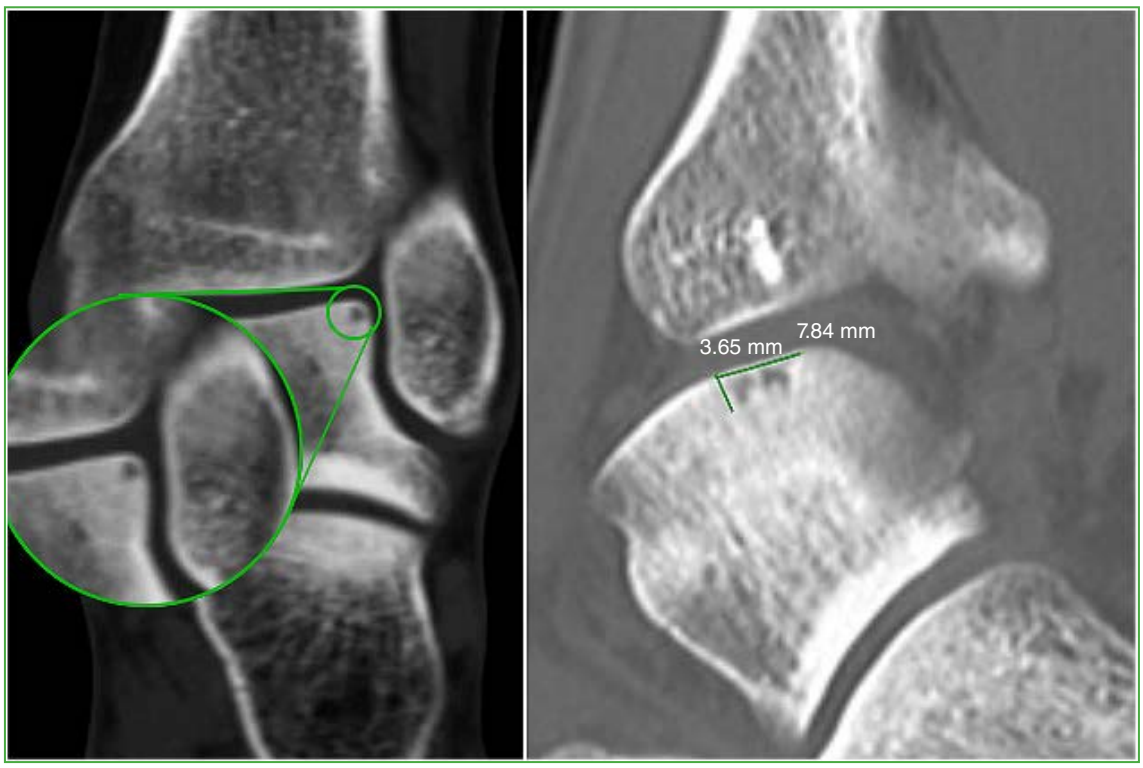

Figure 1. Computed tomography of the ankle, coronal and sagittal images. Osteochondral lesion measuring 7.8 x 4.0 mm (green arrow).

Magnetic resonance imaging: Osteochondral lesion of the lateral aspect of the talar dome measuring 11 x 4 mm. Calcification of the anterior talofibular ligament and synovitis of the anterior ankle compartment (Figure 2).

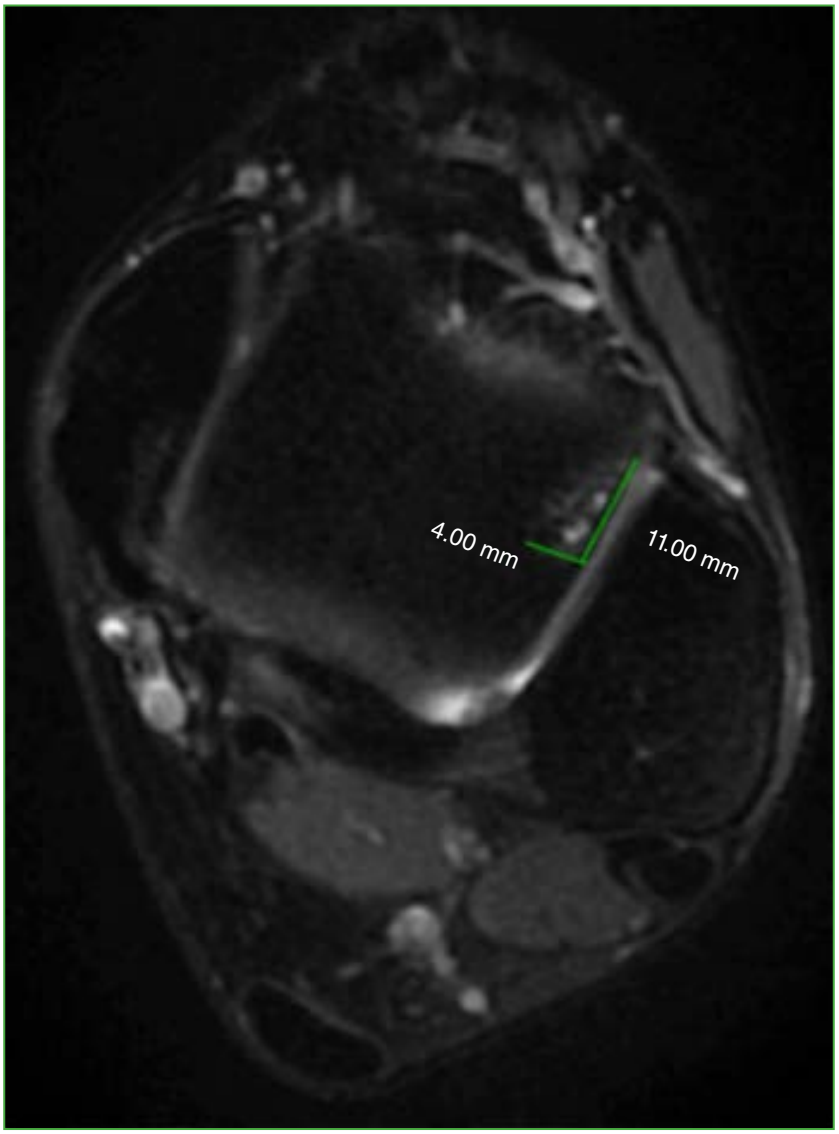

Figure 2. Magnetic resonance imaging of the ankle, axial image. Osteochondral lesion measuring 11.0 x 4.0 mm (green line).

Initial Therapeutic Intervention

Surgical plan: anterior ankle arthroscopy for anterolateral soft-tissue impingement syndrome, synovitis, and an osteochondral lesion (Raikin zone 3-6).

Anterior ankle arthroscopy was performed through standard anteromedial and anterolateral portals. Synovitis, hypertrophy, and hyperemia of the anterior inferior tibiofibular ligament (Bassett's ligament) and the anterior talofibular ligament were observed. The osteochondral lesion was located in Raikin zone 3-6 and was classified as grade 3 according to the *International Cartilage Repair Society* (ICRS) classification (Figure 3).

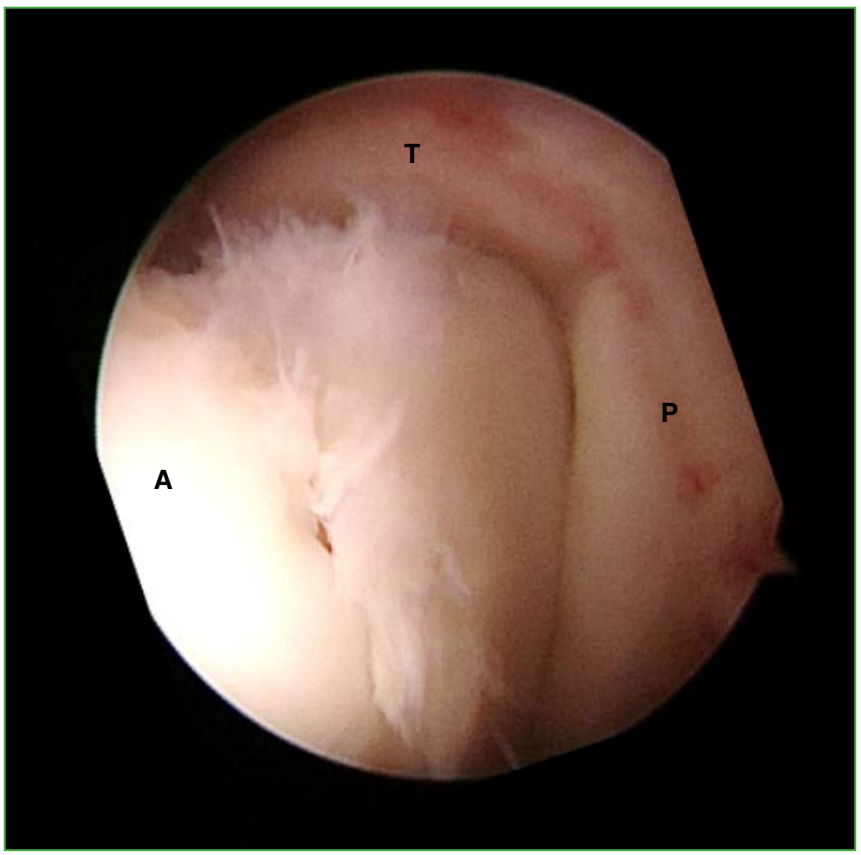

Figure 3. Arthroscopic image of the osteochondral lesion after synovectomy. T = tibia; P = fibula; A = talus.

Arthroscopic treatment consisted of synovectomy of the ankle joint and the affected ligaments, along with debridement of Bassett's ligament. The osteochondral lesion was treated with curettage of the lesion bed, excision of the delaminated cartilage, and smoothing of the lesion margins using a shaver. The procedure was completed with microfracture treatment. At the end of the procedure, an elastic compression bandage was applied. Ankle range of motion was allowed immediately, and weight-bearing was restricted for 1 month.

The patient progressed favorably during the first 2 weeks. Subsequently, he developed disproportionate pain over the anterior aspect of the ankle, which limited dorsiflexion and interfered with physical therapy. During weight-bearing, the pain caused an antalgic gait. There were no signs or symptoms of infection. Additional diagnostic studies were requested.

Postoperative Diagnostic Evaluation

Magnetic Resonance Imaging: An extra-articular nodular lesion measuring 21 x 22 mm was identified in the anterior aspect of the ankle joint. The lesion had a cystic appearance and heterogeneous contents suggestive of blood products (Figure 4).

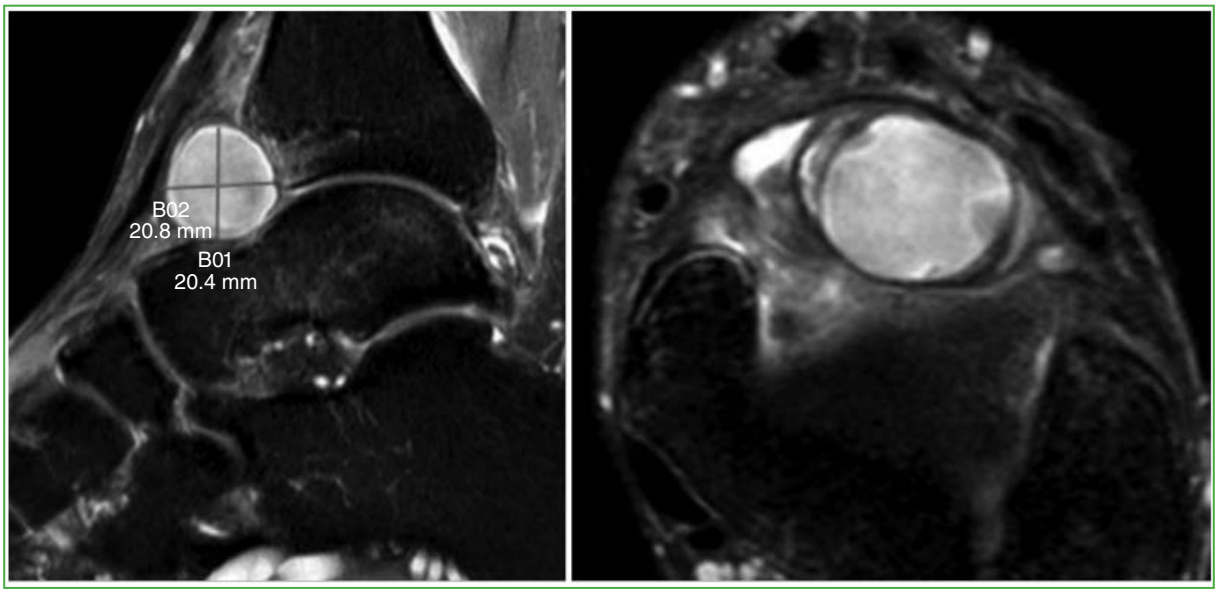

Figure 4. Magnetic resonance imaging of the ankle, sagittal and axial images. Pseudoaneurysm of the anterior tibial artery measuring 21 x 22 mm (green lines).

Doppler ultrasound: Pseudoaneurysm of the anterior tibial artery measuring 18 x 16 mm, with persistent flow within the lesion.

Therapeutic Intervention for the Complication

In collaboration with the Interventional Radiology Department, a percutaneous thrombin injection was administered into the pseudoaneurysm under Doppler ultrasound guidance to induce thrombosis.[6] This procedure achieved thrombosis of most of the pseudoaneurysm; however, immediate follow-up studies demonstrated persistence of a small residual vascular sac with persistent flow. To complete treatment, selective angiography of the anterior tibial artery was performed a few days later. After identifying the pseudoaneurysm neck, embolization was performed through a microcatheter with placement of a microcoil within the pseudoaneurysm sac (Figure 5).

Follow-up and Outcomes

No conventional open surgical procedure was required. Endovascular treatment allowed rapid recovery while avoiding major complications. No adverse events occurred during either intervention, and the patient tolerated both the thrombin injection and microcoil embolization without complications.

Following embolization of the pseudoaneurysm, symptoms improved progressively. Five months after surgery, the patient was pain-free and demonstrated marked improvement in ankle range of motion. At 8 months postoperatively, he had regained full ankle motion and reported only occasional discomfort with forced maximal dorsiflexion, which did not limit his physical activities.

Figure 5. Microcoil placement within the pseudoaneurysm.

DISCUSSION

Pseudoaneurysms are a very rare complication following ankle arthroscopy, with a reported incidence of 0.008%.[5,7]

Anatomically, the anterior tibial artery and its terminal branch, the dorsalis pedis artery, are closely related to the anterior capsule of the ankle joint at the level of the talar neck and lie deep to the superior and inferior extensor retinacula. Anatomical variations have been described, including lateral deviation in 5.5% of cases and medial deviation in 3.5%. The artery may be injured during insertion or removal of arthroscopic instruments and, particularly, during synovectomy. The anterocentral portal has been associated with the highest incidence of vascular injury and has therefore largely fallen out of routine use.[8-10]

This complication is often diagnosed late. Patients typically present with disproportionate pain and swelling, followed by the development of a pulsatile mass. The condition is associated with considerable morbidity. Reported complications of pseudoaneurysms include hemarthrosis, vascular rupture, pain, swelling, and restricted range of motion.[11]

Doppler ultrasound and angiography can confirm the diagnosis of a pseudoaneurysm involving the anterior tibial artery or its terminal branch. Treatment options range from local compression and thrombin injection to coil embolization and open surgical resection.[12]

A major strength of this case is that it illustrates the effectiveness of minimally invasive endovascular treatment for a pseudoaneurysm in the distal leg, thereby avoiding open surgery. Furthermore, it highlights the importance of maintaining a high index of suspicion in patients who develop disproportionate pain following ankle arthroscopy. The coordinated multidisciplinary management provided by the orthopedic surgery and interventional radiology teams resulted in a favorable functional outcome.

The main limitation of this report is that it describes a single case, and therefore its findings cannot be generalized. Evidence regarding this complication is limited to isolated case reports and very small case series, making it difficult to establish precise risk factors or preventive measures beyond the general recommendations applicable to ankle arthroscopy. Furthermore, the exact timing of the arterial injury could not be determined because clinical manifestations appeared in a delayed fashion, which is a well-recognized characteristic of pseudoaneurysms.

CONCLUSIONS

This complication is extremely uncommon and is frequently diagnosed late, resulting in increased morbidity. A high index of suspicion is essential in patients presenting with disproportionate pain, swelling, or a pulsatile mass. Early diagnosis and prompt treatment are crucial for achieving favorable outcomes. In this case, endovascular management enabled successful treatment of the pseudoaneurysm, facilitated rapid recovery, and avoided the need for a more morbid open surgical procedure.

Conflicts of interest: The authors declare no conflicts of interest.

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