

Case report

# Endovascular management of post-traumatic peroneal pseudoaneurysm associated to arteriovenous fistula after sport-related injury

## *Association d'un pseudo-anévrisme fibulaire et d'une fistule artérioveineuse : traitement endovasculaire après un traumatisme sportif*

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### Abstract

**Purpose.** – A rare complication of high energy traumatism of the lower limbs could be the development of post traumatic pseudoaneurysm (PSA) of the tibial arteries associated with arteriovenous fistula (AVF). Symptomatology could be challenging and leading to misdiagnosis.

**Methods.** – Endovascular treatment with covered stent deployment or coil embolization has been now replaced by open surgery.

**Report (Results).** – Coil embolization of a post-traumatic peroneal PSA + AVF in not compound tibia and fibular fractures of the leg was performed.

**Conclusion.** – This case highlights the possible use of coil embolization for PSA and AVF treatment and reviewed the recent literature on this issue.

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**Keywords:** Pseudoaneurysm; Lower limb; Embolization

### Résumé

**Objectif.** – Le pseudo-anévrisme post-traumatique des artères tibiales, associées à une fistule artérioveineuse, est une complication rare d'un traumatisme du sport. Le risque est de méconnaître une symptomatologie complexe.

**Méthodes.** – La chirurgie ouverte est actuellement préférée au traitement endovasculaire par déploiement d'une endoprothèse couverte ou l'embolisation par spirale.

**Résultats.** – Une embolisation par spirale était réalisée pour un pseudo-anévrisme fibulaire avec fistule artérioveineuse chez un sportif présentant une fracture fermée fibulaire et tibiale.

**Conclusion.** – Ce cas montre que l'embolisation par spirale est un traitement possible pour le pseudo-anévrisme fibulaire avec fistule artérioveineuse. La présentation est suivie d'une revue de la littérature.

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**Mots clés :** Pseudo-aneurisme ; Membres inférieurs ; Embolization

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## 1. Background

Peripheral post-traumatic pseudoaneurysm (PSA) is rather uncommon, despite a high incidence of limb trauma.

Coexistence of post-traumatic PSA and arteriovenous fistula (AVF) is even more infrequent in particular in sports trauma [1,2]. PSA pathogenesis, as well as those resulting after gunshot or as iatrogenous complications, is related to arterial traumatism in compound fractures. PSA may result from erosion of adjacent bone whereas bone edges damage the wall of both artery and vein creating AVF.

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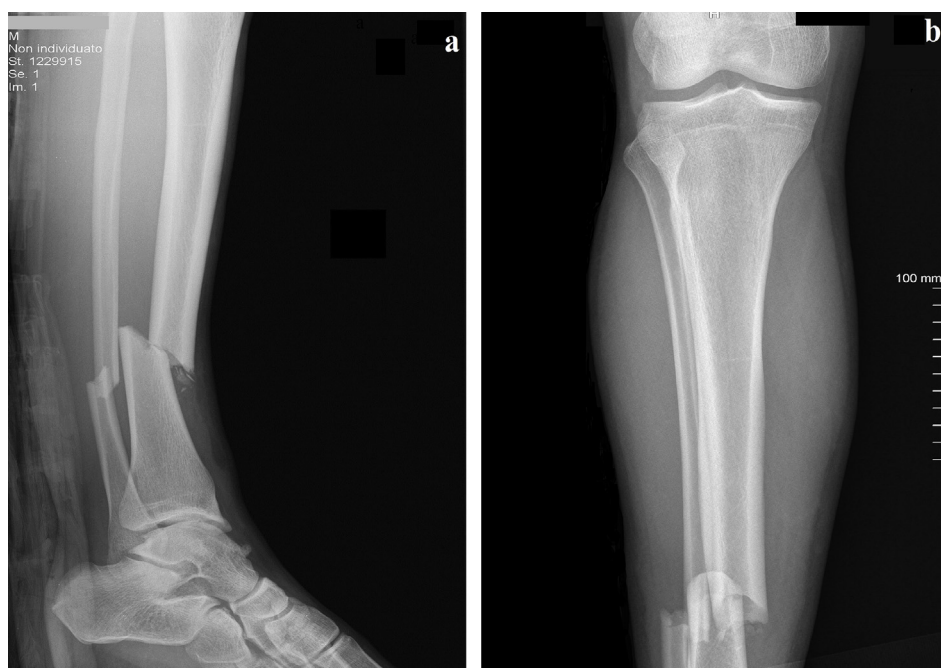


Fig. 1. Preoperative X ray of the right leg: a–b: distal tibia and fibular fractures.

## 2. Case presentation

A 30-year-old male with a silent clinical history suffered a severe injury after an appalling tackle, during a soccer match, causing closed not compound tibia and fibular fractures of the right leg (Fig. 1a–b). He was referred to an orthopedic and traumatologic hospital. Reduction of tibial fractures was performed, through an intramedullary  $10 \times 320$  nailing (TRIGEN™ META-NAIL™). In the first post-operative day, the patient presented severe right leg oedema and calf pain. No signs of deep venous thrombosis (DVT) were detected by venous Doppler ultrasound (DUS). A day later, the patient was carried to our emergency department for persistent oedema and progressive hypoesthesia with dorsiflexion's impairment. Arterial DUS revealed posterior tibial artery patency, anterior tibial artery (ATA) subocclusion and peroneal artery occlusion with patency of the dorsalis pedis artery. Once excluded the compartment syndrome, the patient was submitted to computed tomographic angiography (CTA), which revealed the presence of a PSA of the distal peroneal artery, limited by the smashed interosseous membrane. PSA was  $13 \times 13$  mm of diameter and 45 mm in length and presented early enhancement of the satellite veins, discovering also the AVF coexistence (Fig. 2a–d).

By an anterograde femoral access with a 4F introducer, a 0.035-in hydrophilic guidewire was inserted and a 4-F Glidecath catheter (Radifocus® Glidecath®, Terumo; Tokyo, Japan) was advanced into the tibio-peroneal trunk (TPT) to localize PSA and the AVF at the end of peroneal artery (Fig. 3a). We observed also radiographic abnormalities of the ATA at the lower third of the limb, distally refilled by collateral circulation. The catheter was carefully guided into the PSA and a 0.035-inch coil  $\times$  5 cm length and 5 mm diameter (MReye®, Cook Medical, Bjaaeverskov, Denmark) was placed into the distal segment of peroneal

artery. Then, three more coils (two 0.035"-5-3 and 0.035"-5-10) were placed into the sac. Control fluoroscopy revealed persistent refilling of the aneurismal sac (Fig. 3 b). Therefore, a last 0.035"-5-5 coil was deployed into the inward of peroneal artery with successful conclusion of the procedure (Fig. 3c). At discharge, the patient had no signs of peripheral ischemia and neurologic deficits were partially regressed. After rehabilitation, at six months follow-up, he reported reduction of the leg oedema and recovery of functions with minimal residual neurological deficit. DUS control showed persistent PSA exclusion, patency of PTA and recovery of dorsalis pedis artery and diphasic flow in ATA (Fig. 4a–b). Informed consent has been obtained by the patient to publish this case report.

## 3. Discussion

PSA is a focal dilatation of an artery, involving only the two outer mural layers (media and adventitia). Its pathogenesis is prevalently related to penetrating injuries able to create a focal disruption of the arterial wall, leading thus to a pulsatile hematoma in direct communication with the arterial flow, inducing in its turn the enlargement of diameter at least  $>50\%$ . Arterial traumatism is prevalently secondary to: stab injury, industrial accident or iatrogenic trauma (such as external orthopedic fixator application), fire arm injury or road traffic accident may result in PSA, sport trauma being responsible for a negligible number of cases (Table 1).

Despite the low epidemiologic impact, PSAs are clinically challenging because of the risk of misdiagnosis and deteriorating symptomatology. Few PSAs clot spontaneously and if left untreated may evolve towards rupture, thrombosis, distal embolization or expansion, causing adjacent local compression

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