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Case Report
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Coronary Stent for Treatment of Iatrogenic Peroneal Artery Pseudoaneurysm and Arteriovenous Fistula after Orthopedic Implants Removal Surgery

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Abstract

Background: Few case reports describe development of PSAs after removal of orthopedic implants. To date, no specific guidelines exist for peripheral PSAs management and different surgical or endovascular solutions have been proposed.

Case Report: We report a case of a 70-year-old woman who developed a delayed clinical evident pseudoaneurysm of the peroneal artery 2 months after orthopedic surgery to remove implants (plate and screws) prior placed to reduce a right peroneal fracture. At physical examination a pulsatile mass in the anterior compartment, just above the external malleolus, was present, and Duplex Ultrasound Scan (DUS) and computed tomography angiography showed the presence of a peroneal artery pseudoaneurysm with concomitant arteriovenous fistula. An endovascular treatment was performed under local anesthesia *via* anterograde femoral percutaneous access. Pseudoaneurysm was excluded implanting one coronary stent. Postoperative course was uneventful, and the patient was discharged on the first postoperative day under antiplatelet therapy. Pre-discharge DUS revealed complete pseudoaneurysm and arteriovenous fistula exclusion.

Conclusion: In conclusion, endovascular treatment of peroneal artery pseudoaneurysm using coronary stent seems to be a feasible option.

Keywords: Iatrogenic pseudoaneurysms; Orthopedic surgery; Peroneal artery; Coronary stent

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Abbreviations

PSA: Pseudoaneurysms; DUS: Duplex Ultrasound Scan; CTA: Computed Tomography Angiography; AVF: Arterio-Venous Fistula; TPT: Tibio-Peroneal Trunk

Background

Peripheral iatrogenic Pseudoaneurysms (PSA) are quite rare, despite a high incidence of surgical procedures. Iatrogenic infrapopliteal vessels pseudoaneurysms are mostly described in the literature as a complication of surgical or interventional vascular procedures such as open balloon thrombectomy, subfascial endoscopic perforator vein surgery, transcutaneous catheter-assisted thrombus aspiration and orthopedic surgery as open reduction and fracture internal fixation, tibial plate removal, ankle or knee arthroscopy or arthroplasty and they can be associated with significant morbidity [1-3]. Few case reports describe development of PSAs after removal of orthopedic implants [4,5]. To date, no specific guidelines exist for peripheral PSAs management and different surgical or endovascular solutions have been proposed.

Case Presentation

A 70-year-old female was admitted to our outpatient clinic complaining of pain and swelling of the right limb.

Two months earlier the patient underwent orthopedic surgery to remove implants (plate and screws) placed 18 months before to reduce a right peroneal fracture. At physical examination a pulsatile mass in the anterior compartment, just above the external malleolus, was present, with valid anterior and posterior tibial artery pulses (Figure 1).

Figure 1: Preoperative patient physical examination: pulsatile mass in the anterior compartment, above the external right malleolus.

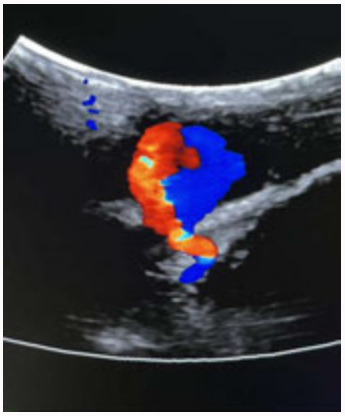

Figure 2: Preoperative DUS showing PSA of the distal peroneal artery.

Figure 3: Preoperative CTA reconstruction showing PSA of Peroneal artery.

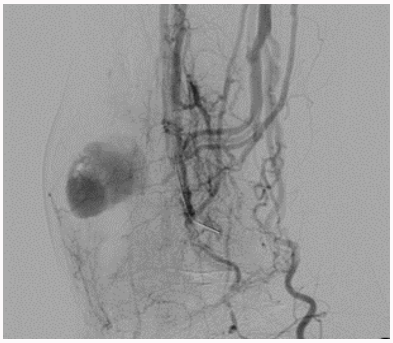

Figure 4: Intraoperative angiography image showing presence of AVF.

Figure 5: Angiographic final result of stent placement.

Figure 6: Postoperative DUS showing complete PSA exclusion.

Arterial Duplex Ultrasound Scan (DUS) revealed the presence of a PSA of the distal peroneal artery (Figure 2). A Computed Tomography Angiography (CTA) was performed confirming the presence of a pseudoaneurysm with maximum diameters in the axial plane of 25 mm × 20 mm and with craniocaudal extension of 40 mm; the PSA showed a small vascular pedicle that, from the interosseous membrane, headed towards the peroneal artery (Figure 3). Moreover, the CTA revealed concomitant Arterio-Venous Fistula (AVF).

In order to exclude the pseudoaneurysm, an endovascular treatment was performed.

By an anterograde femoral access with a 6F introducer, a 0.035-inch hydrophilic guidewire was inserted and a 6-F Multipurpose catheter (Terumo; Tokyo, Japan) was advanced into the Tibio-Peroneal Trunk (TPT) to localize PSA and AVF at the end of peroneal artery (Figure 4). Angiography showed also peroneal artery occlusion distally to the PSA.

A 0.014 Pilot guidewire (Pilot; Abbott Vascular) was introduced and the diagnostic catheter retrieved. Subsequently, one coronary 3.0 mm × 20 mm covered balloon-expandable stent (PT Papyrus; Biotronik, Germany) was delivered. Completion angiography showed complete PSA and AVF exclusion, with good patency of the implanted graft (Figure 5). Pain and tenderness immediately disappeared at the end of the procedure.

The postoperative course was uneventful and the patient

was discharged on the first postoperative day in good general condition under dual antiplatelet therapy (clopidogrel 75 mg/die and acetylsalicylic acid 100 mg/die). Pre-discharge DUS confirmed complete pseudoaneurysm exclusion (Figure 6).

Discussion

PSAs are the result of focal disruption of the arterial wall causing a pulsatile hematoma; long bone fractures, stab injury, iatrogenic trauma, firearm injury or car accidents are the most frequent cause of PSAs. They are often misdiagnosed leading to a delay in treatment and worsening of patient symptomatology. In literature, the reported delay from the trauma and PSA diagnosis ranges from 7 days to 13 weeks but it could be related also to the time in which a PSA develops and grows [6]. Sometimes PSAs clot spontaneously or are managed conservatively if they are small and asymptomatic. Yet, potentially, if left untreated PSA can rupture, cause distal embolization or local compression. Sometimes AVF can coexist when local trauma damages also the nearby veins as well. DUS is usually the first level examination to assess the presence of PSAs and AVFs, followed by CTA or arteriography to confirm the lesions and better study their morphology.

Even though most experiences have reported PSAs occurred after implants surgery, our case occurred after implants removal [3-10].

Different treatments both open or endovascular such as ligature of the artery, artery repair, vein graft interposition, coils or thrombin embolization, covered stent graft placement have been proposed [7-9]; over the years endovascular treatment has gained a predominant role over open repair thanks to improvement of materials, minimally invasive approach and good results [6,10-12].

In this case, an endovascular approach was also preferred over open surgery as the patient had already undergone two orthopedic surgery and thick scar tissue was present at the level of the leg.

Direct thrombin injection and coil embolization were excluded because of big dimension of PSA sac and the coexistence of AVF; the potential risk of embolization in venous district was considered greater than the possible complications from using a stent. Consequently, a minimally invasive endovascular solution was chosen aiming to exclude both PSA and AVF, preserving first segment peroneal artery patency *via* coronary stent placement.

Unfortunately, no dedicated devices are currently available for tibial vessels, so it was necessary to use a coronary stent. Although not specifically reported, from a theoretical point of view the existing biomechanical differences between the coronary and tibial districts are significant and this could somehow affect the outcome of non-dedicated devices. However, in a case like this one when an extensive coverage is unnecessary, just one short stent implanted may minimize the risk of vessel thrombosis as compared to extensive coverage of tibial vessel [13].

Conclusion

As there is not standardized treatment for iatrogenic PSAs, every case should be evaluated individually, considering anatomical and clinical features of the patient to choose the best treatment option.

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