Embolization of pseudoaneurysm with arteriovenous fistula of deep femoral artery secondary to a stab wound: case report

Embolização de pseudoaneurisma com fístula arteriovenosa de artéria femoral profunda decorrente de ferimento por arma branca: relato de caso

Leonardo Pessoa Cavalcante[1], Rafael Scarpari[2], Talita Mendes de Queiróz[2], Antônio Oliveira de Araújo[1], José Emerson dos Santos Souza[1], Marcos Henrique Parisati[1], Ricardo Dias da Rocha[1], Marcos Velludo Bernardes[1]

Abstract

The local complications of penetrating injuries involving arteries include hematoma, pseudoaneurysm and arteriovenous fistulas. Traumatic injuries to the deep femoral artery are uncommon because of its anatomic location. We report the case of a young male patient who was victim of a stab wound to the posterior thigh who was later diagnosed with an injury to the descending branch of the deep femoral artery and treated using endovascular techniques. A review of the literature confirmed the rarity of the case, since the majority of cases of traumatic injuries to the deep femoral artery that have been reported were due to complications during orthopedic procedures or fractures involving the proximal femur.

Keywords: penetrating wounds; femoral artery; injuries; therapeutic embolization; endovascular procedures.

Resumo

As complicações locais de uma lesão arterial penetrante incluem hematoma, pseudoaneurisma e formação de fístula arteriovenosa. A artéria femoral profunda, por sua localização anatômica, é sede infrequente de lesões traumáticas. Relatamos um caso de paciente jovem, vítima de agressão por arma branca em face posterior de coxa, em que foi diagnosticada, tardiamente, lesão de ramo descendente da artéria femoral profunda, sendo então tratada com técnica endovascular. A revisão de literatura corrobora a raridade do caso, sendo a maioria dos casos de lesão traumática de artéria femoral profunda relatada como decorrente de complicação de procedimentos ortopédicos ou fraturas envolvendo o fêmur proximal.

Palavras-chave: ferimentos penetrantes; artéria femoral; lesões; embolização terapêutica; procedimentos endovasculares.

[1]Universidade Federal do Amazonas - UFAM, Hospital Universitário Francisca Mendes - HUFM, Vascular and Endovascular Surgery Service, Manaus, AM, Brazil.
[2]Universidade Federal do Amazonas - UFAM, School of Medicine, Manaus, AM, Brazil.
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INTRODUCTION

The local complications of penetrating injuries involving arteries include hematoma, pseudoaneurysm (PSA) and arteriovenous fistulas (AVFs).[1] The lack of large-scale epidemiological studies investigating the prevalence of posttraumatic arteriovenous fistulas and pseudoaneurysms is probably because these injuries often remain undetected and also because of the small number of cases reported; however, there is a trend for the incidence of these injuries to increase as a result of the rise in urban violence over recent years.[1,2]

We describe the case of a patient with a PSA involving a descending branch of the deep femoral artery and a contiguous AVF, both secondary to a penetrating trauma (stab wound) who was treated using endovascular techniques.

CASE REPORT

A 20-year-old male patient who had been the victim of a knife attack presented with a wound to the posterior mid-third of the left thigh. The initial examination did not detect distal ischemia or any other localized signs of arterial injury, the stab wound was sutured and the patient discharged from hospital.

Ten days after the trauma, the patient once more presented at the emergency room with a painful non-pulsating swelling on the medial surface of the left thigh, with no signs of infection and with normal and symmetrical distal pulses. The patient was admitted for arteriography which revealed a PSA in the distal segment of the descending branch of the left deep femoral artery with a contiguous AVF (Figure 1). In view of the anatomical difficulties anticipated in achieving open surgical access to the injury, the decision was taken to treat the patient using endovascular techniques. After superselective catheterization, the arterial branch feeding the pseudoaneurysm cavity was embolized percutaneously with controlled release metallic microcoils, thereby completely sealing the arterial injury feeding the neocavity (Figure 2). Immediate angiographic control showed no opacification of the PSA and that there was no longer any arteriovenous communication (Figure 3). The immediate postoperative period was uneventful and the patient was discharged two days after surgery and referred to the outpatient clinic for follow-up. A control arterial Color Doppler-US (at 30 days) confirmed that there was no flow into the pseudoaneurysm and, clinically, the swelling on the medial surface of the left thigh had regressed considerably.

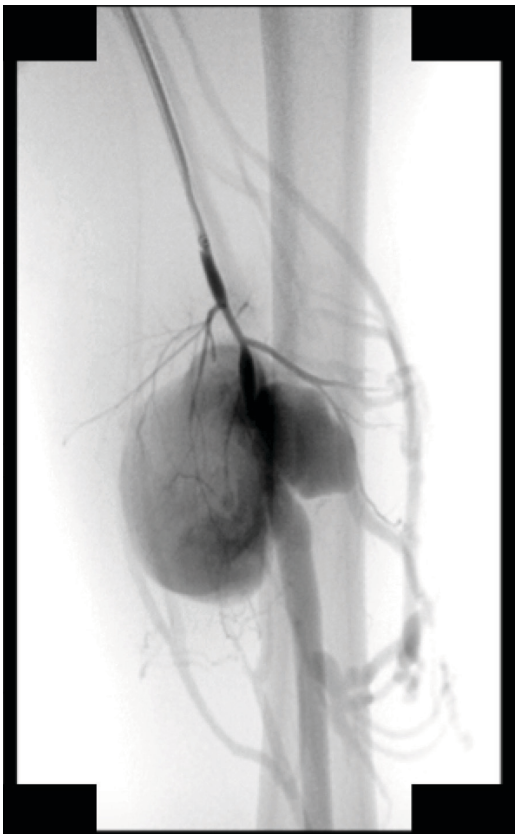

Figure 1. Arteriography showing the pseudoaneurysm and the arteriovenous communication.

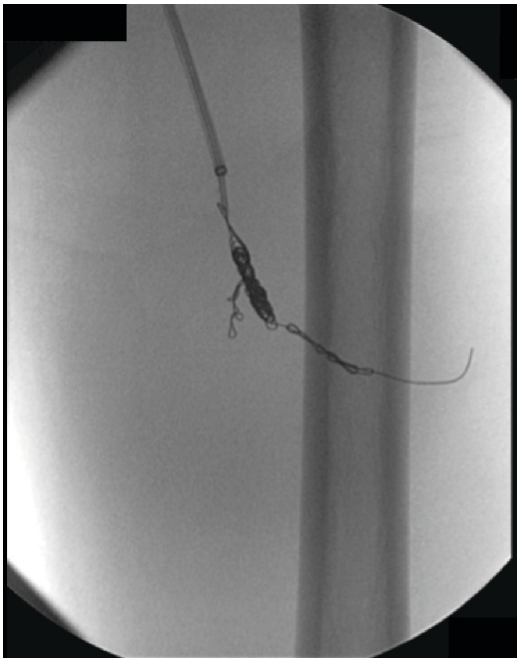

Figure 2. Release of microcoils to seal the communication with the pseudoaneurysm.

Figure 3. Immediate postoperative angiographic control.

DISCUSSION

The deep femoral artery has proximal branches at the hips (medial and lateral circumflex femoral arteries) before it enters the deep thigh adjacent to the medial margin of the femur (the descending branch).[3] Its position inside the muscle compartment protects it, and traumatic injuries to this artery are rare.[1] The majority of injuries that are reported are the result of surgical treatment of proximal femur fractures or, less frequently, due to fractured bone fragments.[4,5] Pseudoaneurysms result from a contained rupture of the artery wall and, depending on the etiologic mechanism, they can be classified as acquired (penetrating or blunt trauma), iatrogenic (for example, during vascular access and orthopedic surgery) or spontaneous (vasculitis and infections).[5] The insult to the artery wall leads to formation of a pulsating flow into the perivascular space, which in turn causes dissection of surrounding tissues and formation of a neocavity that is pressurized by direct communication with the bloodstream.[6] Since pseudoaneurysms do not have all three elements of the normal artery wall, they are at high risk of rupture.[7] In the case described here, since the stab wound had also damaged the contiguous venous branch, the flow originating from the arterial branch filled the pseudoaneurysm cavity and was drained via the contiguous venous injury (AVF).

Diagnosis of PSA of the deep femoral artery is very often delayed.[7] This is primarily because of the non-palpable nature of the aneurysm, located inside the musculature of the thigh.[3] During the initial stages, subtle signs and symptoms such as pain, swelling and formation of hematoma caused by the expanding lesion are very often mild and are frequently disregarded.[1,5] As the pseudoaneurysm expands, a palpable pulsating hematoma may appear, accompanied by murmur or thrill (if there is a concomitant arteriovenous fistula).[4] The mass effect of a hematoma or a large PSA can cause necrosis of the skin or compression of nerves and vessels.[5] In the case described here, the delay in diagnosis was caused by the trauma mechanism (a stab wound distant from the vessels' path) and the absence of clinical signs of vascular injury when the initial physical examination was conducted.

Several different imaging exams can be used to confirm a diagnosis of PSA of the deep femoral artery, including color Doppler ultrasonography, magnetic resonance imaging/magnetic resonance angiography, computed tomography with contrast and digital subtraction arteriography.[1,5] Digital subtraction arteriography is considered the gold standard for diagnosis of PSA[1] because it enables a precise diagnosis of injury size and site, the vessels feeding the aneurysm and the patency of the distal arterial tree, and it can also be used during treatment in addition to its diagnostic applications.[1,3,7]

Recently, endovascular treatment has emerged as an alternative option to open surgery, even in victims of traumatic arterial injuries, being particularly useful for injuries in which it is anticipated that intraoperative proximal and/or distal arterial control may prove difficult, and in cases of damage to both arteries and veins.[7,8] Another advantage is the shorter length of hospital stay and the earlier return to daily activities.[7-9]

Endovascular treatment options for PSAs include embolization with cyanoacrylate (glue) or coils (with fibers or in platinum) and placement of stents (covered or not).[7] Coils are metallic devices designed to create a permanent thrombosis in a vessel and are primarily employed for saccular aneurysms and PSAs.[8,9] Release may be controlled, enabling more precise positioning, or free.[7,9]

It can be concluded from this report that employing endovascular techniques for embolization of traumatic

injuries, such as PSAs and FAVs, can be an effective option and that, in selected patients, this technique could be the first-choice treatment option.

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Correspondence
Leonardo Pessoa Cavalcante
Hospital Universitário Francisca Mendes, Serviço de Cirurgia Vascular/Endovascular
Av. Camapuã, 108 - Cidade Nova II
CEP 69097-720 - Manaus (AM), Brazil
Tel.: +55 (92) 36492700
E-mail: leonardocavalcante@uol.com.br

Author information
LPC - Chief of the Endovascular Surgery Service, Hospital Universitário FranciscaMendes/Universidade Federal do Amazonas (UFAM).
RS and TMQ - Medical students at Universidade Federal do Amazonas (UFAM).
AOA - Resident physician at the Vascular and Endovascular Surgery Service, Hospital Universitário Francisca Mendes/Hospital Universitário Getúlio Vargas, Universidade Federal do Amazonas (UFAM).
JESS, MHP and RDR - Assistant physicians at the Vascular and Endovascular Surgery Service, Hospital Universitário Francisca Mendes, Universidade Federal do Amazonas (UFAM).
MVB - Chief of the Vascular Surgery Service, Hospital Universitário Francisca Mendes/Universidade Federal do Amazonas (UFAM).

Author contributions
Conception and design: JESS, AOA
Analysis and interpretation: RS, RDR
Data collection: RS, TMQ, AOA
Writing the article: RS, TMQ, JESS
Critical revision of the article: LPC, MHP
Final approval of the article*: LPC, MVB
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*All authors have read and approved of the final version of the article submitted to J Vasc Bras.