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Case Report

Non-traumatic (spontaneous) superficial femoral artery dissection: A case report [☆]

Rafael Cueto, MD^{a,*}, Camilo Zuñiga, MD^a, Ernesto Afanador, MD^b

^a Universidad del Norte – Hospital Universitario del Norte, Clínica General del Norte, Barranquilla, Colombia

^b Clínica General del Norte, Universidad del Norte, Diagnóstico Maipú – Sociedad Argentina de Radiología, Hospital Puerta de Hierro de Majadahonda and CDITE (Centro de Diagnóstico y Terapia Endoluminal), Santa Cruz de Tenerife (Canarias), Barranquilla, Colombia

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ABSTRACT

Non-traumatic or spontaneous dissection of the superficial femoral artery is an extremely rare entity, being more common in the external iliac artery in relation to intensive physical activity, pregnancy, among others. It has a variable clinical presentation. The diagnosis is made through angio-tomography (Angio-CT), angio-resonance (Angio-MR) and/or arteriography, the last one being diagnostic and therapeutic.

The case of a 62-year-old female patient with a history of high blood pressure who consulted due to intense pain in the left lower limb is discussed. The diagnosis of dissection was made through arteriography and she underwent endovascular repair, showing favorable results.

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Introduction

Non-traumatic or spontaneous dissection of the femoral artery is a rare condition, with few cases reported in current literature. It consists of the separation of the layers of the artery wall without a clear history of trauma in patients with predisposing factors such as pregnancy, collagenopathies, intense exercise, and atherosclerosis. Its clinical presentation varies from asymptomatic patients to those experiencing

sudden and intense pain, weakness, paresthesias, and/or loss of arterial pulse in the affected limb.

The arteriography reveals a spiral-shaped irregularity of the lumen due to dissection, and true lumen occlusion secondary to the generation of the false lumen. This finding can be also visualized in the angiography CT scan. However, CT has limitations in assessing the vessel wall, a task that can be facilitated by the use of intravascular ultrasound (IVUS) [1].

The few cases of this pathology found in the literature are discussed further, including the case of Niitsu et al, involving

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* Corresponding author.

E-mail address: rafael.cuetogonzalez@gmail.com (R. Cueto).

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a female patient who experienced leg pain after exercise with a similar diagnosis [2]. Singh et al also presents a patient with a history of Ehlers-Danlos known as a predisposing factor for the mentioned pathology [3], and another case reported by Rahmani et al, involving a 46-year-old male patient diagnosed with superficial femoral artery dissection by angiography [4]. In all the aforementioned cases, the clinical presentation is similar, and the diagnosis is made by angiography.

The purpose of this report is to mention the case of a female patient with spontaneous dissection of the superficial femoral artery, its endovascular treatment by interventional radiology, and its favorable outcomes.

Clinical case presentation

A 62-year-old female with a history of arterial hypertension and childhood polio presented with intense pain and paresthesias in her left calf, which improved with rest. Physical examination revealed tenderness, distal coolness, and absence of peripheral pulses in the affected limb. The patient reported a prior Doppler ultrasound indicating femoral artery stenosis, but the report and images were unavailable. An intra-institutional CT Angiography revealed stenosis of the superficial femoral and popliteal arteries, characterized by a double lumen in the vessels, suggesting arterial dissection



Fig. 1 - (A) Axial Section (B) Coronal Section of Angio CT. Superficial femoral artery showing intimal flap and the double lumen sign (arrow).



Fig. 2 – (A) Axial section and (B) coronal section of angio-CT. Popliteal artery with intimal flap and double lumen causing total vessel occlusion (arrow), coronal section showing revascularization of the tibioperoneal trunk through collaterals (arrowhead).

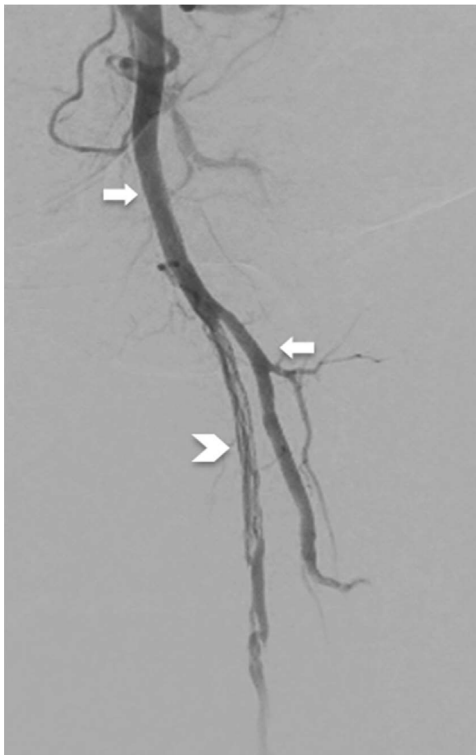


Fig. 3 – (A) Subtraction arteriography showing the common femoral artery and healthy deep femoral artery (arrow), superficial femoral artery with spiral-shaped irregularity of the lumen along its entire course (arrowhead).

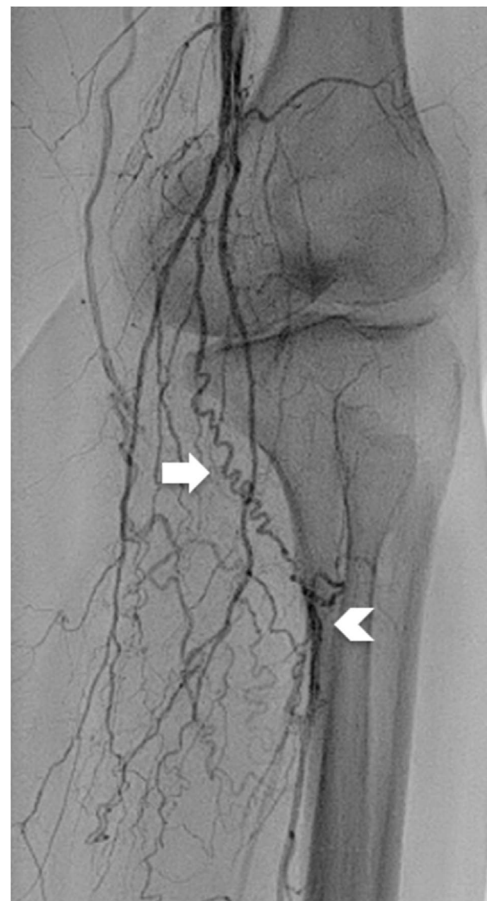


Fig. 4 – Subtraction arteriography at the knee level showing a spiral-shaped irregularity of the lumen in the popliteal artery (white arrow), with total distal occlusion and revascularization of the tibiofibular trunk through multiple collaterals (arrowhead).

(Figs. 1 and 2). These findings led to the recommendation for arteriography for further characterization.

During arteriography, the left iliofemoral axis, common femoral artery, circumflex, and deep femoral arteries were visualized with preserved size and patency. Attention was drawn to a spiral-shaped irregularity of the lumen, with filling defect and atrophy along the entire course of the superficial femoral artery, associated with total occlusion of its distal third and the popliteal artery. Recanalization occurred through collaterals at the level of the tibiofibular and anterior

tibial trunks (Figs. 3 and 4). Consequently, based on these findings, endovascular repair of the affected vessels was decided.

The procedure began by puncturing the right common femoral artery using the Seldinger technique with a 6 FR introducer. Non-ionic, water-soluble contrast material was injected

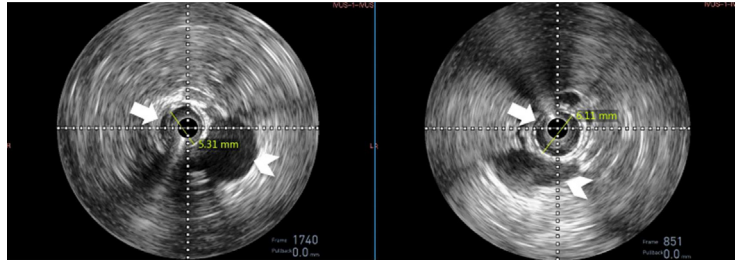


Fig. 5 – (A, B) IVUS images depicting areas of chronically evolving dissection in the superficial femoral artery and popliteal artery. A true lumen of approximately 5 mm is visible (arrow), along with an adjacent hypoechoic image corresponding to the false lumen, showing echogenic areas due to chronic thrombi (arrowhead).

using an automatic injector. A hydrophilic guide wire was advanced over a cobra catheter, and selective catheterization of the left iliofemoral segment was performed. Significant spiral-shaped irregularity of the lumen was observed in the superficial femoral segment up to its distal portion, with occlusion and partial recanalization at the tibiofibular and anterior tibial trunk level.

A 4 FR x 100 cm multipurpose catheter and a Stiff hydrophilic guide wire were used to repair and recanalize the superficial femoral segment up to the middle third. Repair of medium-caliber vessels was performed via percutaneous endovascular intervention.

Subsequently, a Victory 18g guide wire and a Gladius 0.18" guide wire were unsuccessfully employed. It was decided to perform a retrograde puncture a guided by ultrasound at the level of the posterior tibial artery, and a Gladius guide wire was passed to recanalize and repair the previously occluded popliteal and superficial femoral segments using the "true and true" technique. A multipurpose catheter and an 18 microcatheter were used for recanalization, and a 0.35" Trailblazer catheter with a 0.14" Advantage guide wire was advanced to the posterior tibial artery. Balloon angioplasty was performed with a 3.0/3.5 mm balloon along the vessel extension, followed by intravascular ultrasound (IVUS), revealing multiple areas of chronic-looking dissection in the superficial femoral extension, with a dominant lumen of approximately 5 mm in diameter from the superficial femoral region to the popliteal region (Fig. 5).

According to these findings and the persistence of some stenotic areas, balloon angioplasty with a 5 mm balloon was performed in the extension of the superficial femoral artery and proximal popliteal region, yielding satisfactory angiographic results (Fig. 6), with no signs of restenosis observed by intravascular ultrasound.

Discussion

Spontaneous dissection of a peripheral artery affecting a limb is uncommon, with the iliac artery being the most common location, and the superficial femoral artery being even rarer, for which current epidemiological data is lacking [5].

The femoral artery is a direct branch of the external iliac artery, making it one of the main arteries supplying blood to the lower limbs [6].

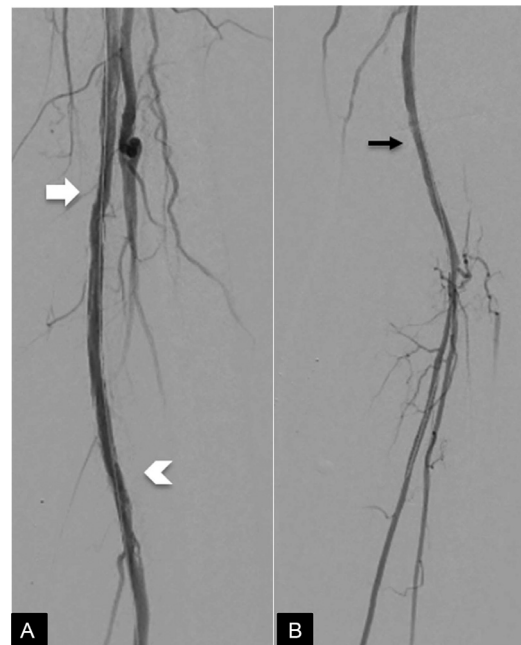


Fig. 6 – (A) Post-treatment arteriography showing a patent superficial femoral artery (white arrow) with improvement in filling defects, (B) Patent popliteal artery, and tibioperoneal trunk (black arrow) with adequate flow.

In 2002, Rahmani et al. reported a case of superficial femoral artery dissection in a 46-year-old male who presented with sudden intense pain in his left calf that improved at rest. Angiography revealed distal dissection of the superficial femoral artery, leading to surgery involving resection of the dissected segment with subsequent reconstruction [4].

The clinical presentation of this pathology is highly variable, sometimes identified as an incidental finding in asymptomatic patients. In other cases, as the one previously mentioned, it can present with sudden and intense pain, paresthesias, weakness, color changes, and skin temperature variations, or a decrease or loss of arterial pulse [5,6].

Niitsu et al. presented the first case of a female patient without pathological history experiencing intermittent claudication after physical activity at a gym. Angio-CT diagnosed dissection of the common femoral artery, leading to endarterectomy with angioplasty obtaining favorable results [2].

Common comorbidities or medical history among patients with non-traumatic spontaneous femoral artery dissection include pregnancy [7], collagenopathies [8,9], alpha-1-antitrypsin deficiency, genetic predisposition, or atherosclerosis-like vascular diseases [10–11]. These conditions share features like vascular remodeling, leading to arterial wall weakness.

The diagnosis of this entity can be made by means of a gray scale ultrasound with color Doppler, which will not only provide us with anatomical information, but also hemodynamic information. Gray scale ultrasound can be useful for the diagnostic approach, observing an echogenic linear image in the lumen of the vessel, which represents the intimal layer dissected from the arterial wall. Upon application of color Doppler, two parallel blood flow channels may be evident, corresponding to the true lumen and false lumen of the dissected artery evaluated. The false lumen may show a reverse flow to the true lumen and may sometimes be occupied by thrombi, which are difficult to distinguish from hematomas and intramural plaques [12]. With the implementation of CT angiography or MR angiography, spiral-shaped irregularity of the lumen and occlusion defects caused by false lumen can be visualized. With angiography, it is possible to directly visualize the area of stenosis and perform the treatment by means of balloons and placement of stents. However it has its limitations when evaluating the vessel wall, solved by intravascular ultrasound (IVUS) which it allows the visualization of the vessel wall in live gray-scale cross-sectional images, and thus evaluate the morphology or the different pathologies in the vessel wall [13].

Pseudoaneurysm emerges as a prevalent consideration in the differential diagnosis for patients exhibiting the aforementioned symptoms. It manifests as a perfused sac directly linked to the arterial lumen via disruption of vessel wall integrity, often stemming from inflammatory, infectious, and neoplastic processes, as well as traumatic incidents and iatrogenic factors. B-mode ultrasonography evaluation typically unveils periarterial hypoechoic lesions in all cases of pseudoaneurysms, often characterized by spherical or ovoid morphology. Additionally, thrombotic elements may be discerned within the pseudoaneurysmal sac. Color Doppler analysis reveals distinctive features such as swirl flow, the “yin-yang” sign, and a “fountain-like” pattern, denoting direct communication between the pseudoaneurysm and the native artery. Moreover, the “to-and-fro” waveform sign can be identified through power waveform analysis [14].

There is still no consensus regarding the treatment of artery dissection, varying according to the severity of the case. Both conservative management and open surgical intervention or endovascular management have been described, the latter being the first line, achieving complete revascularization [15].

In 2012, Singh et al. reported a case of a patient with a history of Ehlers-Danlos syndrome presenting femoral dissection who was successfully managed in a conservative way with rest. Good outcomes were observed with no signs of the previous dissection and no residual stenosis 10 weeks after discharge. While conservative management is an option, there are few other cases describing its outcomes [3].

In our case, endovascular management was chosen using the previously described technique, with favorable results reported in similar cases in the literature.

Conclusion

We presented a case report of a patient with intense pain in the left calf associated with paresthesias, improving at rest. An early recognition of the symptoms of spontaneous dissection of the superficial femoral artery is important, since good results have been demonstrated using endovascular therapy.

Patient consent

As the main researcher, I confirm I obtained a written informed consent from the patient authorizing the publication of this article.

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