

# Giant Spontaneous Femoral Artery Pseudoaneurysm Treated with Covered Stents

## Report of a rare presentation and review of literature

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ام دم كاذبة تلقائية عملاقة بشريان الفخذ تم علاجه بالدعامات المغطاة  
تقرير حالة نادرة ومراجعة للأدبيات

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**المخلص:** نعرض في هذا التقرير حالة لامرأة عمرها 62 سنة، تقدمت بشكوى من كتلة نابضة لمدة شهر بدون سابق إصابة أو تدخل. أظهر التصوير أم دم كاذبة في الجزء البعيد للشريان الفخذي السطحي والتي تم علاجها بنجاح باستخدام الدعامات المغطاة عن طريق التداخل الوعائي.

**مفتاح الكلمات:** أم دم كاذبة؛ الشريان الفخذي؛ التداخل الوعائي؛ الدعامات؛ تقرير حالة؛ الأردن.

**ABSTRACT:** We report the case of a 62-year-old woman who presented with a one-month history of a pulsatile mass, with no antecedent trauma or intervention. Imaging showed a large pseudoaneurysm (PSA) of the distal portion of the left superficial femoral artery. The PSA was treated successfully with endovascular placement of covered stents.

**Keywords:** Pseudoaneurysm; Femoral Artery; Endovascular Technique; Stents; Case Report; Jordan.

**F**EMORAL ARTERY PSEUDOANEURYSMS (PSA) typically result from percutaneous access for the purpose of angiography and other interventions. PSAs can be asymptomatic or manifest as a pulsatile mass or thrill. Rarely, they rupture leading to a life-threatening shock.<sup>1</sup> Operative repair has been largely replaced by image-guided occlusion for iatrogenic femoral PSAs.<sup>2</sup> Spontaneous femoral PSAs are extremely rare, and only a few cases have been described in medical literature. We report a large spontaneous PSA of the distal part of a superficial femoral artery (SFA) which was successfully treated with covered stents.

## Case Report

A 62-year-old woman with diabetes, hypertension, and dyslipidemia presented with a one-month history of a painless, gradually enlarging left thigh mass. There was no history of trauma,

anticoagulation or interventions. On physical examination, a large pulsatile mass was felt in the posterior aspect of the distal part of the left thigh. The distal pulses were normal with good capillary refilling. A complete blood count, coagulation profile, erythrocyte sedimentation rate, C-reactive protein and other vasculitis screening tests were within normal limits.

A duplex ultrasound (US) study revealed a large hypochoic mass with turbulent flow communicating with the distal part of the SFA via a wide neck, and demonstrating a 'to-and-fro' flow pattern [Figure 1A]. These findings, typical of a PSA, were confirmed by a magnetic resonance imaging (MRI) scan [Figure 1B]. After discussing the therapeutic options, including operative and endovascular repair, the consensus was to obliterate the PSA endovascularly. Informed consent was obtained following a discussion with the patient of treatment options, and of the endovascular procedure with its risk and benefits.



**Figure 1 A & B:** A pseudoaneurysm of the distal superficial femoral artery, depicted in (A) a colour Doppler ultrasound image and (B) in a gadolinium-enhanced magnetic resonance angiography.

Under local anaesthesia, an antegrade puncture of the left common femoral artery was performed and a 7 French vascular sheath was inserted. An angiography showed an eccentric sac measuring  $7 \times 6$  cm, with a 3 cm wide neck originating from the distal part of the left SFA [Figures 2A and B]. No thrombus or contrast extravasation was noted. The rest of the extremity angiogram was normal with no signs of atherosclerosis or vasculitis.

Intra-arterially, 5000 IU of heparin was instilled. An 8 mm  $\times$  10 cm self-expanding GORE® VIABAHN® covered stent (W.L. Gore & Associates, Inc., Flagstaff, Arizona, USA) was deployed over a 0.035" J-wire across the neck of the PSA under fluoroscopic guidance. However, during the stent deployment, the guide wire was inadvertently

retracted, resulting in partial coverage of the PSA with part of the covered stent protruding into the PSA sac [Figure 2C]. The covered stent was pulled out of the sac, the wire was repositioned and the stent was then fully deployed. Nonetheless, the sac was only partially excluded [Figure 2D]. Another 8 mm  $\times$  10 cm VIABAHN® stent was deployed to cover the distal aspect of the PSA, which successfully obliterated the neck, restoring normal flow via the stents and distally [Figure 2E]. There were no complications.

Clinical examinations and duplex US studies done at 1 day and 1 week post-procedure, as well as at 1, 2 and 3 months post-procedure, and every 6 months thereafter for 2 years confirmed normal flow and pulses of the stent graft and lower limb with no flow into the PSA.

## Discussion

A PSA is a focal enlargement of the vascular lumen due to the partial or complete disruption of the arterial wall and a contained bleed.<sup>3,4</sup> The leaking blood is either contained by the surrounding tissue or by the intact layers of the media or *tunica adventitia*.<sup>5</sup> The aetiology of a PSA includes trauma, iatrogenic causes, infection, Behçet's disease, Ehlers-Danlos syndrome (type IV) and other connective tissue disorders.<sup>3-10</sup> A femoral PSA is commonly



**Figure 2 A to E:** (A & B) Arteriograms of the left superficial femoral artery depict the large pseudoaneurysm with a wide neck (between the calibers); (C) The first covered stent is deployed with partial herniation into the pseudoaneurysm (long arrow). Note the inadvertent retraction of the guide wire (short arrow); (D & E) Completion images of the overlapping covered stents, effectively excluding the pseudoaneurysm.

**Table 1:** Literature review of spontaneous pseudoaneurysms of the femoral artery

Report	Age in years, gender	Laterality, location	Size	Imaging modalities	Treatment
Present patient	62, F	Left SFA, distal	7 x 6 cm	US, MRA, CA	Covered stent
Kouvelas <i>et al.</i> <sup>17</sup> (2011)	71, F	Right SFA, proximal	10 cm	CTA	Stent graft
Siani <i>et al.</i> <sup>3</sup> (2008)	86, F	Left SFA, middle	4 cm	US, CTA, MRA, CA	Covered stent
Ramus <i>et al.</i> <sup>14</sup> (2007)	74, M	Left SFA, proximal	4 & 5 cm (bilobed)	US, MRA, CA	Covered stent
Goh <i>et al.</i> <sup>8</sup> (2004)	15, M	Bilateral muscular SFA branches	N/A	MRI, US, CA	Embolisation & operation
Origuchi <i>et al.</i> <sup>7</sup> (1996)	71, M	Left common femoral artery	2 cm	CTA, CA	Operation
Lossef <i>et al.</i> <sup>15</sup> (2008)	70, M	Right SFA muscular branch	2.5 mm	CA	Spontaneous obliteration
Lenartova <i>et al.</i> <sup>6</sup> (2003)	82, F	Right SFA muscular branch	N/A	CA	Operation
Cadir <i>et al.</i> <sup>10</sup> (1993)	37, M	Left common femoral artery	N/A	CA	Operation
King <i>et al.</i> <sup>16</sup> (1994)	72, M	Left SFA, proximal	2.5 x 2 cm	CA	Operation

SFA = superficial femoral artery; US = ultrasound; MRI/A: magnetic resonance imaging/angiography; CA = conventional angiography; CTA = computed tomography angiography; N/A = not available.

caused by arterial access for invasive cardiovascular procedures.<sup>6</sup>

Spontaneous femoral PSAs are extremely rare with a limited number of published reports [Table 1]. Although Origuchi *et al.* reported a high incidence of spontaneous PSA (5.9%), those patients were most likely predisposed to this by atherosclerotic changes.<sup>7</sup> Similarly, Siana *et al.* reviewed the 5 published reports in English medical literature and found that all of those cases of spontaneous PSAs had atherosclerotic disease.<sup>3</sup> Spontaneous PSA of the SFA was reported in Behçet's disease.<sup>9,10</sup> As in our case, Goh *et al.* reported bilateral PSAs in a 15-year-old boy which affected the small muscular branches of normal superficial femoral arteries.<sup>8</sup>

The region around the knee is one of the most common sites for a PSA typically related to previous surgical intervention and trauma.<sup>4</sup> In the current case, the PSA was spontaneous and giant, which is a very rare occurrence. PSA occurring in unusual sites or occurring spontaneously, especially in young people, should raise the possibility of vasculitis or connective tissue diseases. However, our patient had no clinical or laboratory evidence of

any of these disorders.

Open surgical repair has traditionally been considered the standard treatment for PSAs, particularly for large iatrogenic ones.<sup>11</sup> Since the PSA had caused no significant haemodynamic or neurological effects in our patient, a less invasive approach was deemed more desirable.

Femoral PSA secondary to arterial access can be treated with ultrasound-guided compression with 70–100% efficacy.<sup>12</sup> There is a better outcome if the PSA is slow growing, less than 6 cm, located below the inguinal ligament and has a narrow neck.<sup>12</sup> The thrombin injections guided by US have become the treatment of choice for iatrogenic femoral artery PSAs, with the success rates ranging from 93–100%.<sup>13</sup> In our patient, we opted to use a covered stent to exclude the PSA in order to avoid early recanalisation of the large lesion. Unfortunately, local experience with and literature on thrombin injections for this particular type of lesion were lacking. Using coils to embolise the PSA was a possible alternative. However, the neck was wide and many coils would have been needed to occlude the PSA, which might have left

a solid mass in a superficial area of the limb. The literature on the use of covered stents for treating spontaneous PSAs is limited. Siana *et al.* reported an 86-year-old woman with atherosclerosis and an acute spontaneous PSA of the superficial femoral artery measuring 4 cm in diameter with a large surrounding haematoma.<sup>3</sup> That PSA was treated successfully with a VIABAHN® covered stent. The authors advocated surgical treatment for young patients and endovascular therapy in elderly or unstable patients, and in diffuse atherosclerosis.

Ramus *et al.* reported the use of a FLUENCY® Plus vascular stent graft (C. R. Bard, Inc., Murray Hill, New Jersey, USA) for the successful treatment of a superficial femoral PSA in a 74-year-old man.<sup>14</sup> The patient had several risk factors, including a history of stroke, chronic renal impairment, hypertension, smoking and atrial fibrillation, and was on oral anticoagulation and antihypertensive medications. In addition, he had advanced atherosclerotic changes. The authors provided no long-term follow-up.

## Conclusion

In conclusion, we believe the endovascular approach with covered stent placement for the treatment of a rare spontaneous PSAs may offer a safe and less invasive therapeutic alternative. The long-term outcome of this relatively new approach is still to be validated.

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