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Case Report

Early stent thrombosis after superficial femoral artery stenting successfully treated with transcatheter rheolytic thrombectomy in a patient with reduced aspirin responsiveness

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ABSTRACT

Purpose: To describe a case of early superficial femoral artery (SFA) thrombosis after stenting in an aspirin low-responsive patient successfully treated with percutaneous mechanical thrombectomy.
Clinical and interventional summary: Early SFA stent thrombosis occurred in a 65-year-old man treated with multiple stent implantation for chronic total occlusion of the left SFA. The potential cause for thrombosis was a suboptimal PTA [percutaneous transluminal angioplasty] result characterized by no-flow limiting residual linear dissection left untreated and which was associated with low responsiveness to aspirin. Rapid thrombus removal and flow restoration were obtained with the Angiojet Ultra Thrombectomy System (Medrad, Warrendale, PA, USA).
Conclusions: Treatment of SFA stent thrombosis should be undertaken with the understanding of the underlying thrombotic causes and the knowledge of the most appropriate therapeutic options. A percutaneous mechanical strategy with the Angiojet Ultra Thrombectomy System may achieve rapid and complete recanalization even in the presence of huge thrombotic burden.
<Learning objective: New devices have been available for huge thrombotic burden management in acute clinical peripheral settings. A few clinical experiences have been described and the case we present shows the safety and efficacy of the rheolytic thrombectomy for femoral stent thrombosis management avoiding bleeding and distal embolization risks.>

Introduction

Thrombotic occlusion of the superficial femoral artery (SFA) is still a major cause of limb ischemia and loss. Conventional treatment includes thrombo-embolectomy with a Fogarty catheter or surgical bypass, while loco-regional pharmacologic thrombolysis is an alternative therapy [1]. However, thrombolysis is limited by high cost and a non-negligible risk of hemorrhagic complications. Recently, percutaneous mechanical thrombectomy has been used successfully.

We describe a case of SFA thrombotic occlusion early after stenting in an aspirin low-responsive patient who was successfully treated with rheolytic thrombectomy.

Case report

A 65-year-old man who was a heavy smoker was admitted for intermittent claudication of the left inferior limb with a <50 m symptom-free interval. Angiography showed chronic total occlusion of the proximal left SFA [TransAtlantic Inter-Society Consensus (TASC) D lesion, >15 cm in length, according to TASC II classification] (Fig. 1a). After antegrade approach, heparin (8000 U i.v.) was administered in a bolus and after predilation, two overlapping nitinol self-expandable stents (Absolute Pro 60 mm + 40 mm × 8.0 mm; Abbott Vascular, Abbott Park, IL, USA) were implanted in the proximal SFA and two nitinol self-expandable stents (Absolute Pro 80 mm + 100 mm × 8.0 mm; Abbott Vascular) in the distal SFA with a good angiographic result. However, a severe no flow-limiting linear dissection of the mid non-stented SFA segment was observed and left untreated (Fig. 1b). The patient was discharged on aspirin (100 mg/day) indefinitely and clopidogrel (75 mg/day) for two months. Ten days later, the patient was urgently hospitalized because of severe pain at rest of the left inferior limb with clinical

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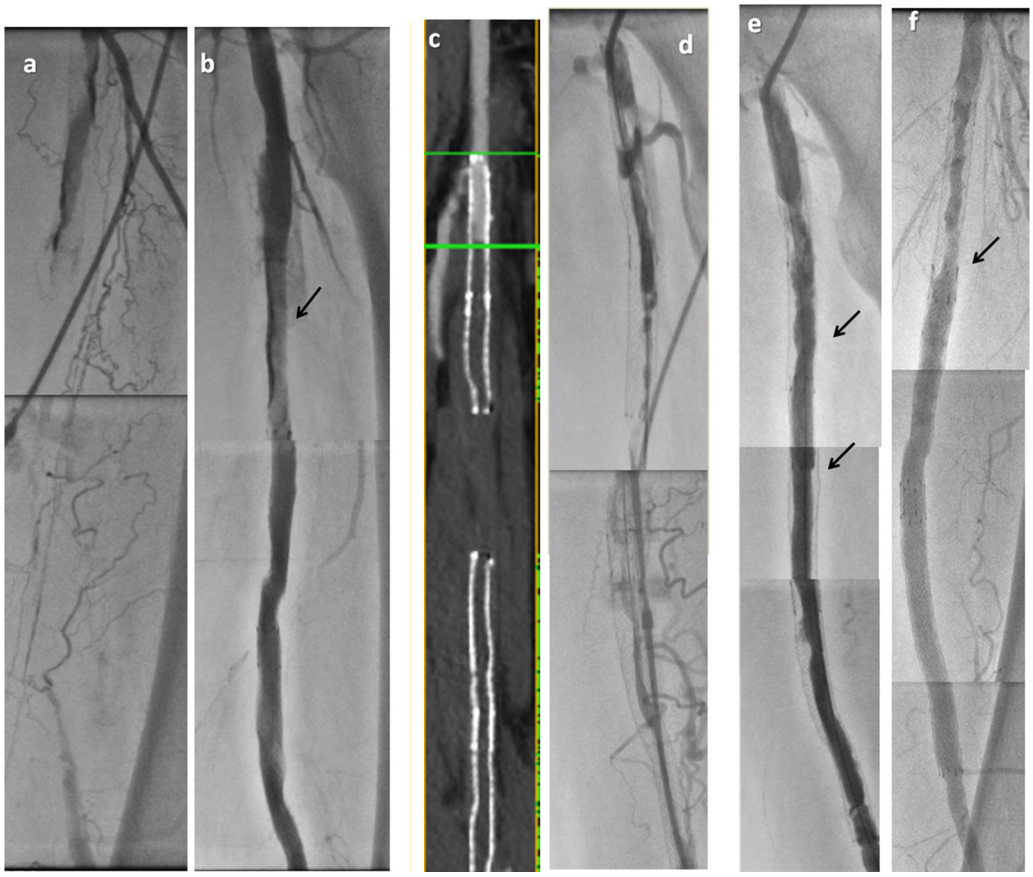

Fig. 1. (a) Baseline angiography showing chronic total occlusion of the left superficial femoral artery (SFA). (b) Final result after recanalization and implantation of four self-expandable nitinol stents. Note the residual linear dissection between the proximal and distal stented segments (arrow). (c) Multidetector computed tomography scan performed 10 days after stenting: longitudinal view of the superficial femoral artery showing occlusive thrombosis. (d) Selective angiography of the SFA confirming diffuse stent thrombosis. (e) Final angiographic result after emergency transcatheter rheolytic thrombectomy and stenting (arrows). (f) Six-month angiographic follow-up showing SFA patency with moderate in-stent hyperplasia (arrows).

signs of acute peripheral ischemia but no sensory loss (grade IIa, Rutherford classification).

Duplex ultrasound showed proximal SFA occlusion and multi-detector computed tomography angiography demonstrated thrombotic stent occlusion (Fig. 1c). At angiography, thrombotic occlusion was confirmed with minimal collateral flow (Fig. 1d). The occlusion was crossed with a 0.035 in. hydrophilic guidewire (Terumo, Tokyo, Japan); a low-profile tip (2.0–1.2 mm) Xpeedior rheolytic catheter (Medrad, Warrendale, PA, USA) was activated for three 90-s cycles and advanced over the guide wire with to-and-fro movements into the occluded stents. Thrombus removal and recanalization were obtained without any distal embolization. The mid SFA dissected segment was treated with stenting (Absolute Pro 60 mm × 8.0 mm; Abbott Vascular) (Fig. 1e). Platelet reactivity tests were performed [2] and showed good response to clopidogrel. Indeed, 48.6% platelet reactivity index was found with the vasodilator-stimulated phosphoprotein assay, 152 platelet reactivity units was measured with the VerifyNow P2Y12 test (Accumetrics Inc., San Diego, CA, USA), and 44% of maximal aggregation with ADP-induced platelet-rich plasma aggregation. On the contrary, a low response to aspirin was observed with the VerifyNow Aspirin test (Accumetrics) (515 aspirin reactivity unit) and the arachidonic acid- and collagen-induced platelet-rich plasma aggregation (75% and 80% of maximal aggregation, respectively) (Fig. 2). Aspirin dose was increased to 160 mg/day achieving better platelet responsiveness at 48 h as demonstrated by VerifyNow Aspirin test (286 aspirin reactivity unit) and arachidonic acid- and collagen-induced platelet-rich plasma aggregation (3% and 41% of maximal aggregation, respectively). The patient was discharged on aspirin 160 mg/day and clopidogrel 75 mg/day. At the 6-month follow-up, he was asymptomatic and control angiography showed stent patency with moderate in-stent hyperplasia (Fig. 1f).

Discussion

SFA stenting compares favorably to balloon angioplasty, particularly in long lesions. Although early thrombosis of peripheral nitinol stents is uncommon, it may cause a serious clinical challenge presenting with acute and severe limb ischemia that requires emergent intervention. One of the major reasons lies in an incomplete vessel revascularization with in-flow or out-flow disease left untreated and precipitating a thrombotic milieu. Late SFA stent thrombosis has also been described, often associated with stent fracture. Indeed, the superficial course of the SFA with crossing of flexion points as well as interaction with the surrounding musculature potentially exposes the artery to relevant external forces, including compression, torsion, and elongation that may cause stent fracture. This may have a negative impact on vessel patency late after stenting [3].

Acute limb ischemia is a serious condition that has been associated with a risk of limb-loss ranging from 5% to 30%, and a mortality rate ranging from 11% to 18% [4–6]. Patients with acute limb ischemia usually present with minimal or no sensory loss, which, in the absence of paralysis is defined as grade IIa or, in the presence of sensory loss extending beyond the toes, grade IIb according to Rutherford acute limb ischemia classification [7,8]. In these cases,

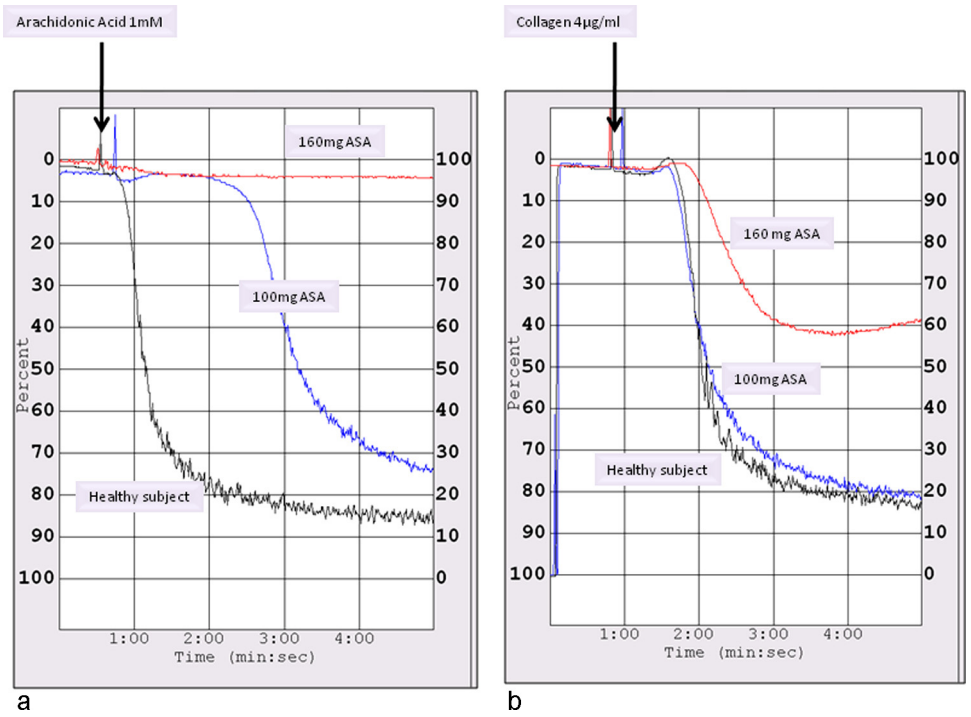

Fig. 2. Platelet aggregation induced by arachidonic acid (a) and collagen (b) determined at 5 min in a healthy subject not taking any antiplatelet drug (black line) and in our patient on two aspirin dosages: 100 mg/day (blue line) and 160 mg/day (red line). ASA, aspirin.

thrombolysis is associated with slow flow restoration, which may aggravate tissue damage and cause hemorrhagic complications [9]. A common treatment option is surgical management employing a thrombolectomy catheter or bypass surgery, especially for severe acute limb ischemia when motor deficit is present (Rutherford class IIb–III). Recently, catheter-assisted thrombectomy has been associated with a lower mortality rate as compared to surgery in high-risk patients [10,11]. In our case, it is likely that the major role in early stent thrombosis was played by the severe, left untreated vessel dissection in-between the proximal and distal SFA stented segment. The intrinsic low-responsiveness of the patient to a standard dose of aspirin (100 mg) prompted a high platelet activation that, together with the unfavorable anatomic setting, favored thrombus formation and vessel closure. This situation was overcome by increasing the daily aspirin dosage, as confirmed by a significantly lower aspirin reactivity to VerifyNow test.

Indeed, the huge thrombotic burden occluding a long SFA segment was a serious condition and a therapeutic challenge requiring prompt intervention in order to prevent limb loss. We obtained rapid thrombus removal and blood flow restoration without distal embolization using the Xpeedior rheolytic catheter connected to the Angiojet Ultra Thrombectomy System (Medrad). This device allows high-speed saline jets inside the catheter that create a powerful low-pressure zone that aspirates the thrombus into the catheter and removes it from the vessel.

Conclusions

In accordance with previous clinical experience from small case series [12,13], our case underlines the importance of understanding the potential causes of occlusive thrombosis after SFA stenting in order to offer to the patient the most appropriate and effective treatment. Thrombosis of a long SFA stented segment is a real therapeutic challenge due to the huge thrombus burden. The Angiojet Ultra Thrombectomy System seems a safe and effective tool to achieve prompt recanalization in these cases avoiding the risk of distal embolization.

Conflict of interest

The authors declare no conflict of interest.

Financial disclosure

None.

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