

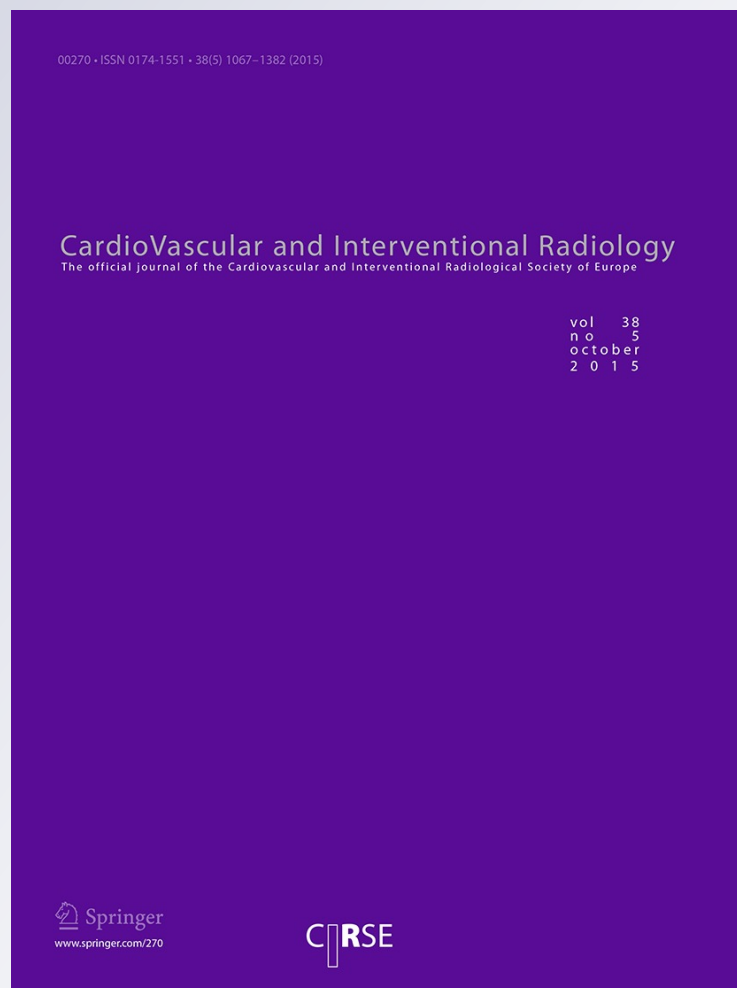
Late Complication after Superficial Femoral Artery (SFA) Aneurysm: Stent-graft Expulsion Outside the Skin

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CardioVascular and Interventional Radiology

ISSN 0174-1551
Volume 38
Number 5

Cardiovasc Intervent Radiol (2015)
38:1299-1302
DOI 10.1007/s00270-014-0970-6



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Late Complication after Superficial Femoral Artery (SFA) Aneurysm: Stent-graft Expulsion Outside the Skin

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Received: 6 March 2014 / Accepted: 15 July 2014 / Published online: 26 August 2014
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Abstract A 78-year-old man presented with a 7-cm aneurysm in the left superficial femoral artery, which was considered unfit and anatomically unsuitable for conventional open surgery for multiple comorbidities. The patient was treated with stent-graft [Viabhan stent-graft (WL Gore and Associates, Flagstaff, AZ)]. Two years from stent-graft implantation, the patient presented a purulent secretion and a spontaneous external expulsion through a fistulous channel. No claudication symptoms or hemorrhagic signs were present. The pus and device cultures were positive for *Staphylococcus aureus* sensitive to piperacillin/tazobactam. Patient management consisted of fistula drainage, systemic antibiotic therapy, and daily wound dressing. At 1-month follow-up, the wound was closed. To our knowledge, this is the first case of this type of stent-graft complication presenting with external expulsion.

Keywords Infection · Endovascular · Stent-graft · Aneurysm · Superficial femoral artery

Introduction

Endovascular treatment of peripheral artery aneurysm is increasingly common as an alternative to surgical repair. Discordant outcomes of endovascular procedures for peripheral artery aneurysm have been reported [1]. A rare complication of superficial femoral artery (SFA) aneurysm endovascular treatment is related to stent and/or stent-graft

infection [2–4]. We report a unique case of stent-graft infection that was associated with almost complete expulsion of the endovascular device outside the body.

Case Report

A 78-year-old Caucasian man was referred to our Vascular Surgery Unit with a tender pulsating mass in the medial region of his left thigh. His prior clinical history included type II diabetes mellitus, smoking, hypertension, and previous deep vein thrombosis. Laboratory tests showed a $9.6 \times 10^3/\mu\text{L}$ white blood cell count (WBC) and 2.1 mg/L C-reactive protein (CPR). The Duplex Ultrasound (DUS) demonstrated a 7-cm left SFA aneurysm, patent popliteal artery, and occluded anterior tibial artery. CT angiography (Fig. 1A, B) was performed to confirm the 7-cm SFA aneurysm and to assess the adequacy of the proximal and distal landing zones (7.5-mm diameter of proximal and distal landing zones). Clinical history, laboratory tests, DUS, and CT angiography findings all together allowed for the diagnosis of a true atherosclerotic SFA aneurysm. Due to the advanced age, associated comorbidities, and presence of extensive peripheral atherosclerotic disease in the affected leg, the patient was deemed high risk and anatomically unsuitable for conventional open repair. A hybrid approach was chosen and the patient was treated under local anesthesia. Single dose of IV antibiotics (2 g Ceftriaxone) was administered for surgical prophylaxis 60 min before operation. After surgical exposure of the left common femoral artery and systemic administration of heparin (5,000 UI bolus), an antegrade left common femoral artery puncture was performed followed by the placement of a 11-F introducer sheath (Avanti plus; Cordis – Johnson & Johnson, Bracknell, UK) and a diagnostic arteriography

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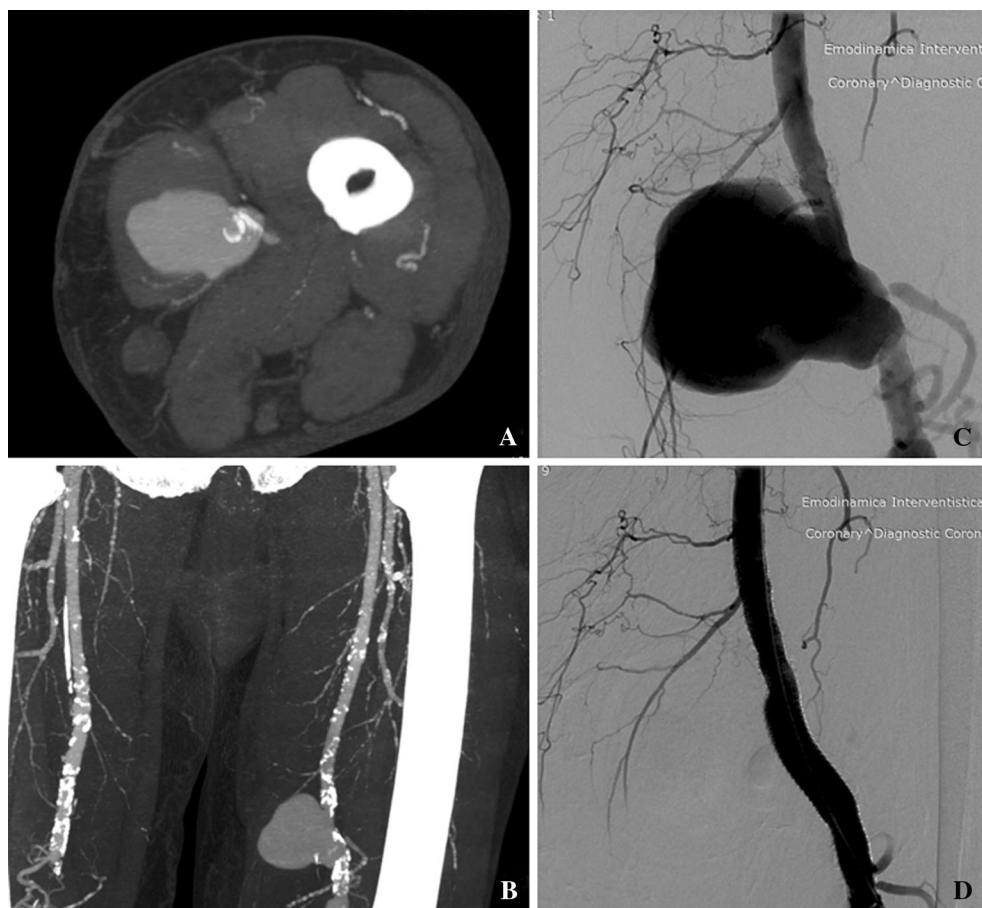


Fig. 1 Transverse (A) and maximum intense (B) projection preoperative CT angiography images showing superficial femoral artery aneurysm. C Intraoperative frontal view arteriogram. Superficial

femoral artery aneurysm. D Intraoperative frontal view arteriogram. Femoral artery aneurysm exclusion after stent-graft deployment

was conducted (Fig. 1C). Over a stiff Terumo wire (Terumo Corp., Tokyo, Japan) a 9 mm × 100 mm Viabhan stent-graft (WL Gore and Associates, Flagstaff, AZ, USA) was deployed to exclude the left SFA aneurysm. Adequate proximal (3.5 cm) and distal (2 cm) landing zones were achieved after stent-graft deployment. The stent-graft was molded with a 9 mm × 100 mm Powerflex balloon (Cordis – Johnson & Johnson, Bracknell, UK). The completion angiogram showed satisfactory results with complete left SFA aneurysm exclusion, stent-graft patency and no endoleaks (Fig. 1D). The patient was discharged on the third postoperative day on dual antiplatelet therapy (aspirin 100 mg die and clopidogrel 75 mg die). Despite multiple attempts to contact the patient, the patient was lost to follow-up. Two years after the intervention, the patient presented to our emergency department with a purulent secretion on his left thigh but with no ischemic pain and was readmitted to hospital. The patient referred that the secretion started 2 months before with no bleeding or symptoms of claudication. At clinical examination, there

was no active bleeding and 75 % of the stent-graft length had extruded outside the skin with surrounding granulomatous tissue (Fig. 2A, B). Laboratory tests showed $9.3 \times 10^3/\mu\text{L}$ WBC and 2.9 mg/L CPR. CT angiography confirmed the stent-graft expulsion through a fistulous channel, SFA occlusion, and distal reperfusion to peroneal and posterior tibial artery (Fig. 3). The patient was transferred to the operating room where the stent-graft was completely removed with a slight traction and the fistula was managed with drainage. Empirical systemic broad spectrum antibiotic therapy with piperacillin/tazobactam 4.5 g administrations two per day was started and daily wound dressing was performed. The cultures from the expulsion site and the explanted stent-graft demonstrated *Staphylococcus aureus* sensitive to the piperacillin/tazobactam; thus, the antibiotic regime was continued throughout hospitalization. The patient was discharged home after 1 week with two per day amoxicillin/clavulanic acid 875/125 mg and daily wound dressing. The wound was closed after 1 month.

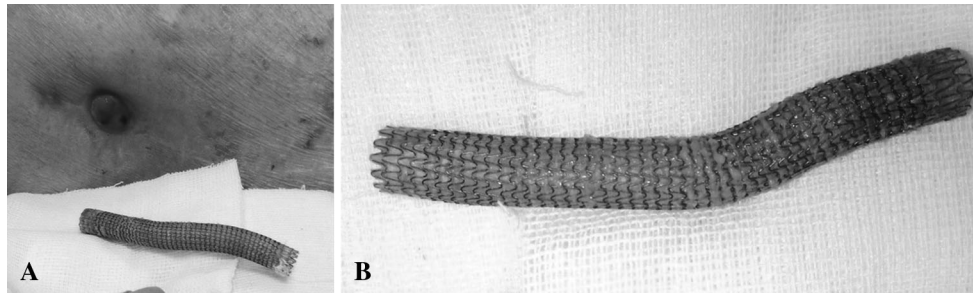


Fig. 2 **A** Clinical presentation at dressing removal. The fistula in correspondence of the medial side of the leg and the stent-graft expulsion. **B** Longitudinal view of the extruded stent-graft

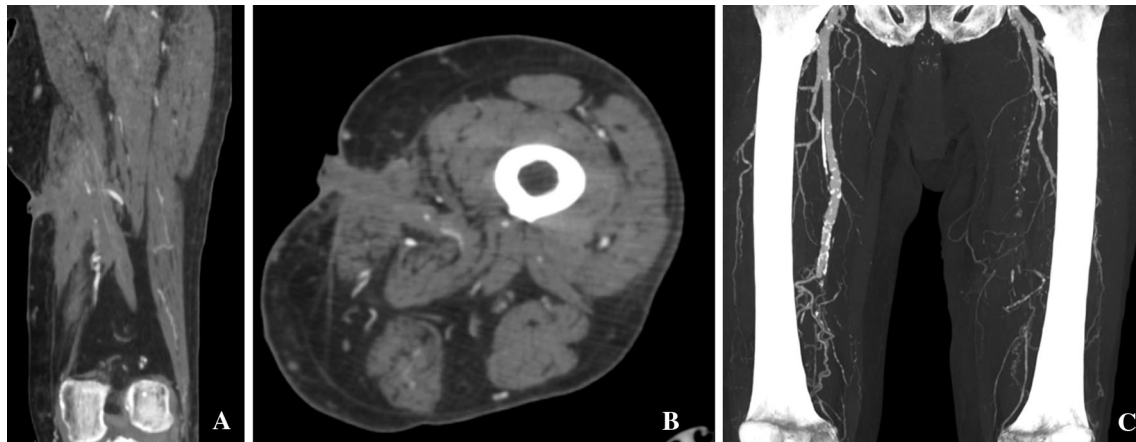


Fig. 3 CT angiography. Coronal (**A**) and sagittal (**B**) multiplanar reconstruction showing fistula. **C** Maximum intense projection showing superficial femoral artery occlusion with no hemorrhage

Discussion

Open surgical repair of peripheral artery aneurysm is the “gold standard” treatment [5, 6]; however, endovascular therapies had been increasingly employed especially in high-risk surgical patients with proximal and short lesions [7]. Stent-graft infection in peripheral arteries is rare but potentially dangerous [4]. The incidence of stent-graft infection after endovascular aortic aneurysm repair had been reported as 0.4–1.0 % [8, 9]. Diabetes and smoking independently increase the infection risk; however, other risk factors previously reported for endovascular procedures, such as absence of sterility, lack of antibiotic prophylaxis, introducer sheath permanence more than 24 h, multiple stents implantation, or multiple procedures in the same region [3], were not present in our case. Infected stent and/or stent-graft usually appear as device thrombosis, septic embolization, pseudoaneurysm, and hemorrhage [10]. Schneider et al. [3] reported a single case of SFA autolysis after Viabahn stent-graft implantation for SFA atherosclerotic disease. The authors advocated the role of malperfusion and foot gangrene as the source of infection.

The clinical presentation of our case was an infected fistula with almost complete expulsion outside the skin of the stent-graft. Postoperative CT angiography findings (Fig. 3) showed the SFA thrombosis and disruption of the surrounding tissues in correspondence to the fistulous channel.

Similarly to the case reported by Schneider et al. the management consisted of local treatment and systemic antibiotic therapy. An open or hybrid [11] vascular reconstruction was not considered due to the absence of ischemic symptoms.

In conclusion, vascular stent and/or stent-graft infection signs have wide variability, and to our knowledge this is the first reported case of spontaneous stent-graft expulsion. Considering that a stent-graft infection by cutaneous-resident bacteria (*S. aureus*) was evident at culture examination and no septic symptoms or signs were present, we can hypothesize two physiopathological mechanisms: (1) early stent-graft thrombosis (with lack of stent washing from the blood flow) was the cause of the stent graft infection and the subsequent expulsion; or (2) an immune reaction to the implanted stent-graft was the cause for the stent-graft expulsion, which was subsequently infected.

Conflict of interest Felice Pecoraro, Ermanno R Sabatino, Ettore Dinoto, Giuliana La Rosa, Giuseppe Corte and Guido Bajardi have no conflict of interest.

Statement of informed consent Informed consent was obtained from all individual participants included in the study.

Statement of human and animal rights “All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.”

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