Superficial femoral artery stent extrusion

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ABSTRACT

The superficial femoral artery is a common location for endovascular treatment of occlusive arterial disease. Stent extrusion is an uncommon complication of stent placement. In the present case report, we sought to raise awareness of this rare complication and have described the management of a single unique case. Although rare, the complication of stent extrusion should be considered in patients with abnormal symptoms after endovascular treatment of superficial femoral artery disease. (J Vasc Surg Cases Innov Tech 2021;7:794-7.)

Keywords: Stent extrusion; Stent infection; Superficial femoral artery

Percutaneous transluminal angioplasty with stenting is the most common endovascular treatment of peripheral artery disease (PAD).[1] Stent extrusion can occur after stent placement; however, the understanding of this rare complication is limited. In the present report, we have highlighted the case of a 65-year-old woman with a painful thigh mass secondary to stent extrusion from the superficial femoral artery (SFA) that was treated by surgical removal. The present patient provided written informed consent for the report of her personal data and imaging studies.

CASE REPORT

A 65-year-old woman with a history of hypertension, coronary artery disease, smoking, and PAD was referred because of a painful mass in her right thigh. Twelve years previously, she had undergone SFA angioplasty and stenting for claudication. She had undergone angioplasty and stent placement (6 mm × 40 mm EverFlex; Medtronic, Minneapolis, Minn) for focal high-grade stenosis of her right SFA. Four months later, she had developed symptomatic in-stent restenosis and had undergone angioplasty and covered stent placement (5- × 100-mm Viabahn stent; W. L. Gore & Associates, Newark, Del). However, 8 months later, she had again developed in-stent stenosis and was treated with repeat angioplasty and stenting (5- × 100-mm and 5- × 50-mm Viabahn stents; W.L. Gore & Associates; Fig 1). Finally, 3 years before the present referral, she had undergone angiography because left leg symptoms, and her right SFA stents were noted to be occluded and outside the usual anatomic position. She was asymptomatic at that time and was left untreated. However, 2 years later, she had developed a painful right thigh mass that slowly worsened, and she was subsequently referred to our clinic (Fig 2).

On examination, she had an erythematous, tender, firm mass in the medial thigh. Computed tomography angiography identified occluded stents that had eroded into the tissue around the SFA (Fig 3). The surrounding fluid and inflammation were confirmed on ultrasound. Her SFA was occluded, and her below-the-knee popliteal artery was reconstituted via collateral vessels.

The patient underwent surgical removal of the extruded SFA stents, with below-the-knee popliteal fossa exploration and abscess drainage via a medial incision. Proximal dissection was challenging because of the presence of significant inflammation. Fluid collection and the stents were encountered within the muscle tissue of the thigh. After the extruded stents were removed, the above-the-knee popliteal artery was clamped below a major geniculate collateral vessel, and the most distal stent, which remained in an intravascular position, was removed. No proximal back-bleeding was observed; however, robust distal back-bleeding was noted, indicating preservation of the geniculate collateral vessels perfusing the leg below the knee. Therefore, the proximal and distal arteries were ligated, and bypass was not performed. The wound was irrigated with chlorhexidine solution, and a 15F Blake drain was placed. No resultant changes were observed in right lower extremity perfusion. The intraoperative cultures were negative for bacterial or fungal infection. She remained stable with no rest pain or tissue loss at 1.5 years after stent removal.

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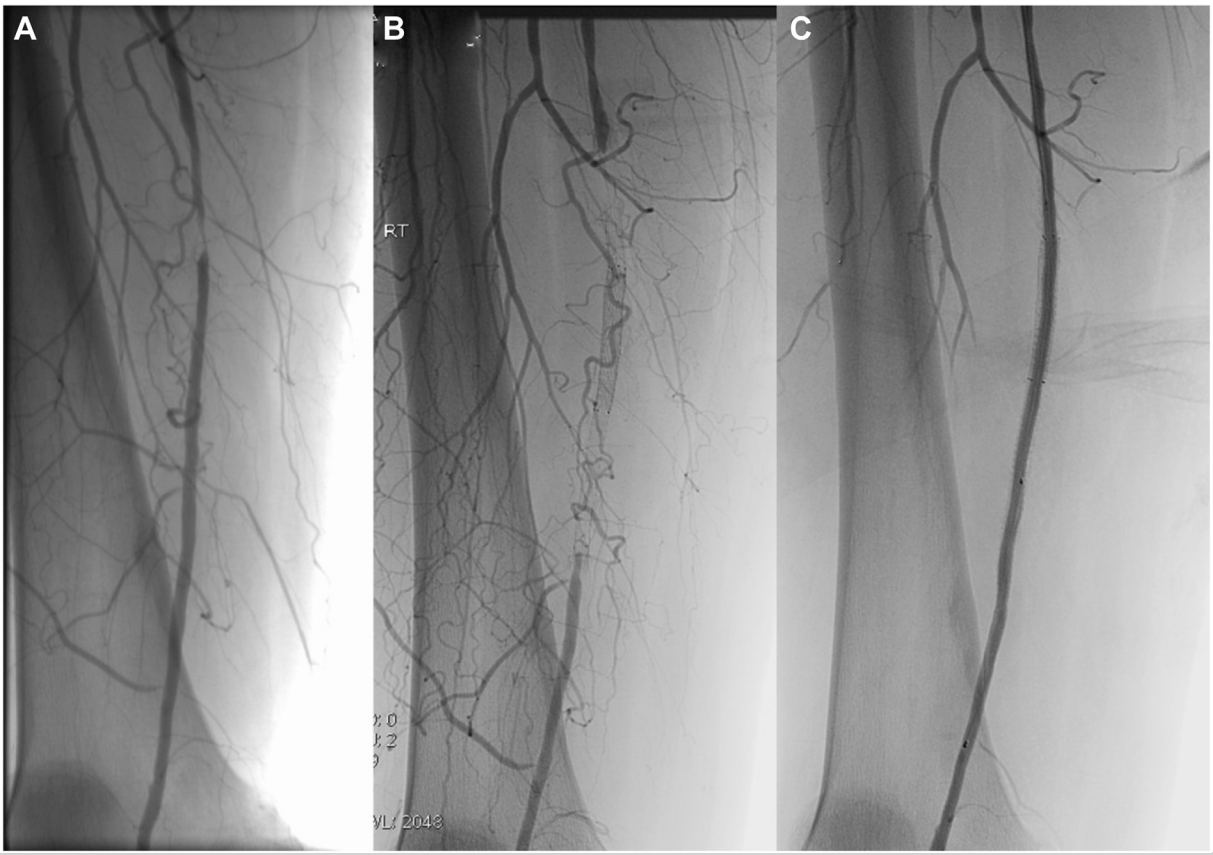

Fig 1. A, Occluded superficial femoral artery (SFA) before treatment in 2007. **B,** Occluded right SFA stent 1 year after initial angioplasty and stent placement. **C,** Post-treatment angiogram after recanalization of the occluded left SFA.

DISCUSSION

In the present case report, we have provided an additional description of stent extrusion, a rare clinical entity. A prior case report described extrusion 2 years after stent placement for a left SFA aneurysm. The patient returned with 75% of the graft extruded outside the skin with surrounding granulomatous tissue infected with *Staphylococcus aureus*.[2] The investigators suggested early stent-graft thrombosis and an immunologic reaction as possible causes of extrusion and subsequent infection. In our patient, the extruded stent had not breached the skin, and the cultures were negative despite the presence of fluid suggestive of infection. The present case also differed in that our patient had been treated for occlusive, rather than aneurysmal, disease, the stents were both bare metal stents and covered, and our patient had undergone multiple interventions. Similarly, Kalkan et al[3] reported a case of stent-graft extrusion outside the skin of an above-the-knee amputation 11 years after femoropopliteal covered stent placement for occlusive disease and 8 years after above-the-knee amputation. The stent-graft was surgically removed without revascularization. The cultures grew skin flora, and oral antibiotics were initiated. The investigators reported infection, thrombosis, and the covered nature of the stent as risk factors for expulsion.[3]

Additional literature review identified other cases of stent extrusion in arterial locations other than the SFA. Aaronson et al[4] described a case of carotid stent extrusion occurring 10 months after covered stent placement for carotid artery blowout. They suggested superficial skin ulcerations and radiation therapy as predisposing factors to the extrusion. The patient was treated by transoral removal of the extruded stent.[4] Maramattom et al[5] described stent-graft extrusion occurring 1.5 years after stent placement for treatment of a post–carotid endarterectomy pseudoaneurysm. The patient had presented 1.5 years after stent placement with an occluded carotid artery, and the stent graft was removed uneventfully. The investigators reported stent undersizing and pseudoaneurysm expansion as predisposing factors to extrusion.[5] Warren et al[6] reported two cases of covered stent extrusion in patients treated for carotid blowout syndrome. These cases demonstrate that stent-graft extrusion is not limited to an anatomic or arterial location and that it might be associated with stent thrombosis.

The mechanism of stent extrusion in our patient remains unclear. Smouse et al[7] reported that regular

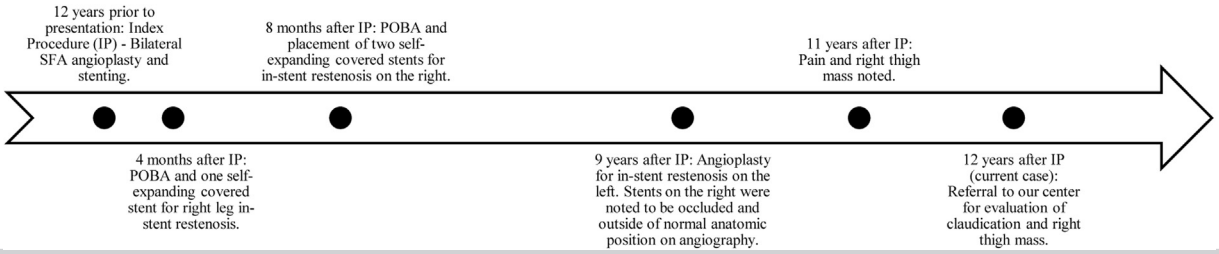

Fig 2. Timeline of the patient's clinical course from the index procedure until referral to our center. *POBA,* Plain old balloon angioplasty; *SFA,* superficial femoral artery.

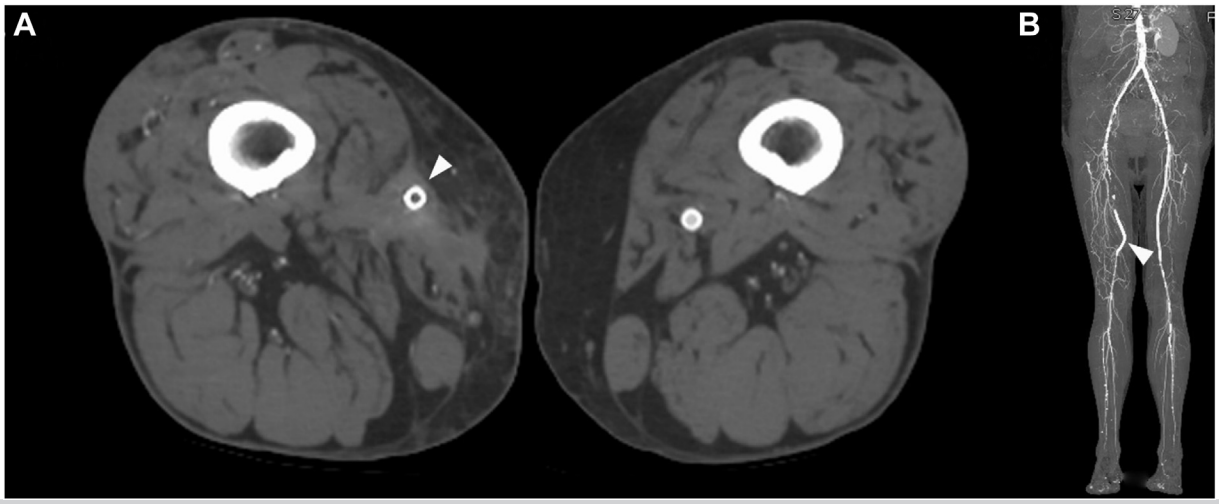

Fig 3. A, Occluded right superficial femoral artery (SFA) stent outside the anatomic position with surrounding fluid. **B,** Reconstructed computed tomography angiogram showing an extruded right SFA stent and occluded right SFA 12 years after initial treatment. *Arrowheads* denote extruded stent material.

limb movements might stress self-expanding nitinol stents placed in the SFA and popliteal artery, causing kinking or fracture. Fractures can also occur when stents are overlapped.[7] In our patient, only one of the stents was a bare metal nitinol stent. However, restenosis had been treated with multiple overlapping stents. This potentially caused rigidity in the SFA and predisposed to stent displacement and extrusion. Our suspicion is that the persistent immunologic and inflammatory reactions at the site of stenting and a possible underlying infection, coupled with repeated vessel manipulation, resulted in progressive weakening of the arterial wall and enabled the extrusion.

An alternative explanation for stent extrusion is the occurrence of a stent-related infection. Although the risk of infection in peripheral stents is low, studies have reported infection developing long after stent placement.[8-13] To the best of our knowledge, no studies have directly compared the infection rates in covered stents vs bare metal stents in the peripheral vasculature. However, a study by Kim et al[14] found no significant differences in the infection rates between bare and covered stents used for exclusion of pseudoaneurysms in hemodialysis access grafts. Although we identified no remote or recent source of infection in our patient, it is possible that the multiple interventions after the index procedure contributed to the development of an infection.

The present case further highlights the importance of medical management for the treatment of claudication. Although rare, the risk of stent infection, occlusion, and extrusion should be considered when treating patients electively for claudication. Patients should receive medical optimization with an antiplatelet agent, a high intensity statin, consideration of cilostazol, and a trial of a walking program before consideration of invasive treatment. For the present patient, surgical revascularization will be reserved for progression of disease to chronic limb threatening ischemia. The risks of a tibial artery bypass outweigh the benefits when performed for claudication. Unless limb threatening ischemia occurs, our patient will receive medical treatment.

CONCLUSIONS

In the present case report, we have described stent extrusion that occurred 12 years after placement in the

SFA for PAD. Stent extrusion should be considered when patients present with an unusual mass or symptoms years after peripheral arterial stent placement.

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