

Endovascular management of ruptured anastomotic pseudoaneurysm at the distal end of a prosthetic femoro-popliteal bypass: a “quick and easy fix”

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Abstract

Background: Rupture of an anastomotic pseudoaneurysm after lower extremity prosthetic bypass is a rare problem, and the traditional mode of treatment has been open surgery.

Case Description: We report the endovascular management of a disrupted distal anastomosis of an above-knee femoro-popliteal Dacron bypass graft. Under local anesthesia and via a femoral cut-down, the Dacron graft was punctured and a 9 x 60 mm stent-graft was implanted resulting in successful pseudoaneurysm exclusion. The patient had an uneventful recovery.

Conclusions: Stent-grafting may offer quick and easy rescue options for such challenging peripheral vascular lesions. Hippokratia 2015; 19 (2):179-181.

Keywords: stent-graft, pseudoaneurysm, anastomotic aneurysm, Dacron graft, femoro-popliteal bypass

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Introduction

Rupture of an anastomotic pseudoaneurysm (APA) after lower extremity prosthetic bypass surgery is a rare but potentially limb-threatening complication¹. The traditional mode of treatment has been open surgical repair, but such re-operations through a previously scarred field may be challenging. We report the endovascular management of a ruptured APA at the distal anastomosis of a prosthetic femoro-popliteal bypass.

Case report

A 65-year old male presented with a 3-day history of a painful pulsatile mass in the right lower thigh. He was hemodynamically stable, but in extreme discomfort and kept his knee slightly flexed. His past medical history included coronary artery disease, hypertension, and a complicated history of right lower limb arterial revascularization procedures. In specific, a right above-knee femoro-popliteal bypass with an 8-mm Dacron prosthesis had been performed nine years earlier for a short distance, lifestyle limiting intermittent claudication. Two re-operations had been required over the following years, first, a revision of the proximal graft anastomosis, and second, an ipsilateral iliofemoral bypass graft. On examination, there was a painful pulsatile mass in the inner surface of the lower thigh in close relation to the lower incision of the femoro-popliteal bypass. There were no signs of local or systemic infection. Peripheral pulses were palpable, and the ankle-brachial index was 0.80. Contrast-

enhanced computed tomography confirmed the clinical suspicion of a ruptured APA at the distal end of the Dacron graft, measuring 4.9 x 4.2 cm in maximum diameter. He was immediately taken to the operating room. Due to the patient comorbidities and the previous arterial procedures in the lower extremity, we opted for a minimally invasive endovascular option.

Under local anesthesia, the Dacron prosthesis, which was easily palpable due to its superficial location in the upper thigh, was dissected and slung. Puncture of the graft was performed under direct vision and angiography confirmed the presence of the pseudoaneurysm in the distal anastomosis (Figure 1). A 0.035”², angled hydrophilic stiff guide wire (ZIPwire™, Boston Scientific, Mountain View, CA, USA) was manipulated through the disrupted anastomosis into the distal popliteal artery and a 9 x 60 mm stent-graft (Fluency, Bard Peripheral Vascular, Tempe, AZ, USA) was implanted to exclude the pseudoaneurysm. Post-dilation was performed with a 6-mm angioplasty balloon distally at the level of the popliteal artery below the anastomosis and with an 8-mm balloon proximally at the level of the Dacron prosthesis due to the diameter mismatch. Completion angiography documented successful relining of the disrupted anastomosis and absence of contrast extravasation. The procedure lasted 20 minutes; the fluoroscopy time was two minutes, and a total of 35 ml of contrast medium had been administered. The pulsatility of the pseudoaneurysm had disappeared and the pain resolved. The post-procedural status regard-

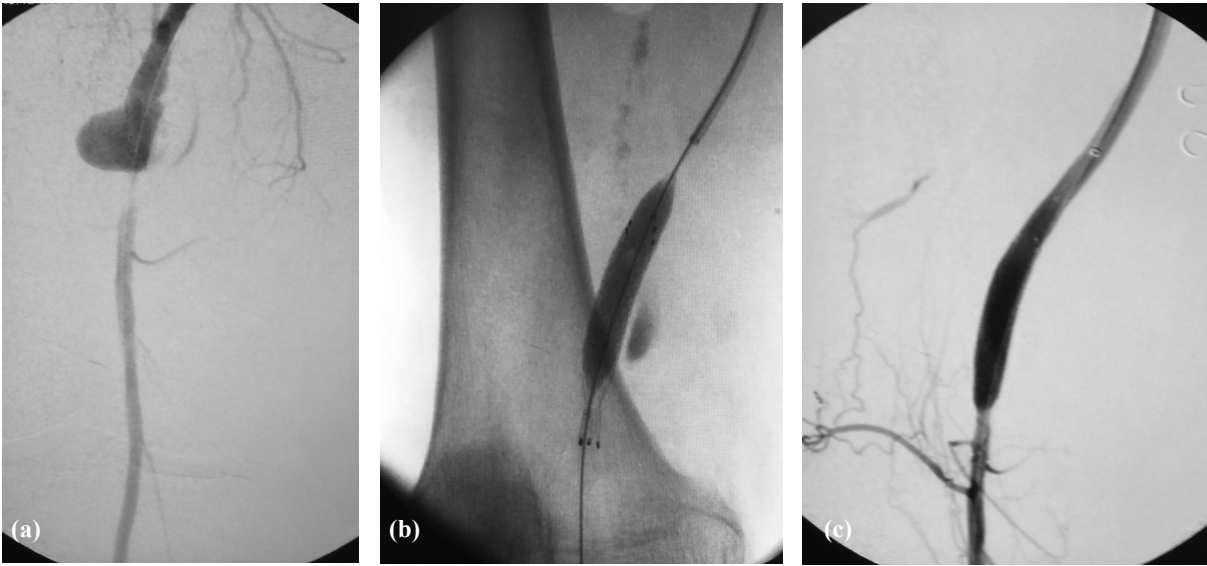


Figure 1: Intra-operative digital subtraction arteriogram (performed via direct graft puncture) showing a disrupted popliteal anastomosis of the femoro-popliteal Dacron bypass graft (a). A stent-graft has been deployed and post-dilated with an angioplasty balloon (b). Note the retained extravasated contrast. Completion angiogram demonstrates successful pseudoaneurysm exclusion (c).

ing distal pulses remained unchanged from the pre-operative one. The patient had an uneventful recovery and was discharged 24 hours later. Computed tomography at one month confirmed successful exclusion and shrinking of the pseudoaneurysm.

Discussion

APAs following prosthetic arterial reconstructions are relatively rare and usually develop from a disrupted arterial anastomosis either after aortofemoral bypass or infrainguinal bypass, or as a complication of dialysis arterio-venous grafts¹. Etiologic factors contributing to their pathogenesis include suture line disruption, graft failure, arterial wall failure, infection, technical error, and physical stress. Generally, most such pseudoaneurysms are asymptomatic and found incidentally on physical examination or imaging. Occasionally, they can manifest with regional symptoms, including a pulsatile mass, pain, and symptoms associated with local compression (e.g. weakness from compression of an adjacent nerve or edema due to deep vein thrombosis)¹. If left untreated, they can be complicated by thrombosis, distal embolization, or, rarely, rupture. As expected, emergency surgery carries a higher morbidity and mortality than elective repair. Interposition graft placement is usually the procedure of choice.

Re-operation in a “hostile” surgical field created by tissue fibrosis and scarring in the presence of hemorrhage from a ruptured APA can be complex and challenging. With the advent of endovascular therapy, stent-graft placement is gaining popularity as a minimally invasive therapeutic alternative to open surgery²⁻⁴. This approach may offer less risk to the patient, especially in the cases

where extensive surgical exploration of deep tissue may be required. Furthermore, it can be done under local anesthesia, is well-tolerated by the patient, and is associated with a shorter hospital stay. Surgical complications, such as hemorrhage and infection, can be avoided in the endovascular treatment. On the other hand, the endovascular options have their complications, too, such as stent-graft kinking or occlusion, the coverage of side branches and intimal hyperplasia. Finally, the long-term patency rate of such an approach is unknown and, therefore, deserves close scrutiny.

There are certain technical points that merit discussion regarding the endovascular treatment of ruptured APAs. One concern is the mismatch between the graft and the native vessel. A 9-mm stent-graft was chosen here to cover the disrupted popliteal artery anastomosis with the 8-mm Dacron graft. Due to the diameter mismatch, this was ballooned with a 6-mm balloon, distally, and an 8-mm balloon, proximally, in order to avoid excessive dilatation and rupture of the popliteal artery. A second talking point is that of an entirely percutaneous approach to the graft versus a surgical cut-down. Certainly, the option of an entirely percutaneous approach is an appealing one and has the advantage of being even less invasive by avoiding dissection and isolation of the graft, which makes it more susceptible to the risk of prosthetic graft infection. However, secure closure of the graft puncture site is also an issue with percutaneous access. A third point that needs addressing is the choice of the certain type of self-expanding stent-graft as opposed to other available stent-grafts. We used a Fluency (Bard) stent-graft because these were the only endografts stocked in our operating room inventory at the time. Another option

would have been to use a Viabhan (W.L. Gore, Flagstaff, AZ, USA) stent-graft, which is even more flexible, a characteristic that makes it useful for areas, such the adductor canal, where the artery is subjected to significant forces (of torsion, flexion, extension and torsion). Given the above, the more rigid balloon-expandable stent-grafts behave less favorably and are not recommended in this setting because of the risk of thrombosis. Finally, whether emergency stent-grafting could be the definitive treatment of a failed bypass with pseudoaneurysm at the distal anastomosis or a temporary, “bridging” solution is debatable. Our intention for this endovascular intervention was to be a definitive treatment. The subsequent plan was to treat the patient expectantly, keeping him under close surveillance, and intervene only when needed. Although the durability of popliteal stent-grafting for an occlusive or aneurismal disease has been recently disputed⁵⁻⁶, there are no relevant patency data for the endovascular treatment of APAs in this anatomical region.

Conclusion

Although endovascular treatment of pseudoaneurysms, arteriovenous fistulas, and arterial ruptures is nowadays a well-established treatment in the literature, reports of stent-grafting to treat APAs of infra-inguinal grafts are few, perhaps due to their relatively infrequent occurrence²⁻⁴. Apart from its rarity, this rare case scenario is also a first-class example of how endovascular therapy has dramatically transformed current emergency vascu-

lar surgical practice. Stent-grafting is an important tool in the armamentarium of the modern vascular surgeon and the inclusion of a variety of stent-grafts in the operating room inventory represents an important advent for the treatment of iatrogenic or traumatic peripheral vascular lesions.

Conflict of interest

Authors declare no conflict of interest.

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