Remnant Prosthetic Graft in Revision or Limb-Salvage Surgery: Routine Complete Excision?

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Background: Prosthetic graft occlusion following vascular reconstruction is a major cause of morbidity commonly necessitating further limb-salvage revascularization or life-saving amputation. It is therefore surprising that there is scant data in the literature regarding the optimal management of any remnant prosthetic grafts left in situ. We present a case series of 3 patients with remnant prosthetic graft infection following revisional arterial reconstruction for limb salvage and a literature review on this topic.

Methods: Three patients presented to our institution with remnant prosthetic graft infection between March 2012 and January 2013. They had all undergone previous infrainguinal bypass surgery with polytetrafluorethylene (PTFE) grafts, which had subsequently thrombosed. Further limb salvage operations with autogenous long saphenous vein bypass in 2 cases and above-knee amputation in 1 case were performed. In all cases, the focus of infection was confirmed to have originated in the redundant remnant PTFE graft left in situ. These grafts were completely excised and the infected wounds were debrided. All patients made a full recovery.

Results and Conclusions: Remnant prosthetic grafts left in situ are shown in this series to be a proven nidus for infection. Published data indicate that these infection rates are greatest in revision vascular surgery and when performing amputations. We propose that routine excision of any occluded remnant prosthetic grafts in revision surgery be considered at the time of revascularization to mitigate against the risk of subsequent infection.

The use of prosthetic conduits for arterial reconstruction is an accepted alternative to autogenous vein in some patients. However, acute prosthetic graft occlusion remains a major cause of morbidity in vascular surgery and often requires urgent limb-salvage arterial reconstruction or amputation. The primary patency of prosthetic graft occlusion following infrainguinal bypass grafts is reported to be 51% at 5 years for femoropopliteal bypass and 24% for femorotibial/femorocrural bypass.[1] The risk factors for graft occlusion are not well identified, but may include technical factors, failure or error, smoking, race, and the presence of graft infection.[2–4]

There is currently no data in the form of randomized control trials (RCT) regarding optimal management of the remnant graft in situations which require further revascularization. One study has reported a higher rate of remnant graft infection after major amputation and the authors suggested at least partial resection of the graft to a level above the amputation stump in an attempt to reduce the risk of secondary infection of the remnant graft.[5] There is little consensus on the optimal strategy with occluded prosthetic grafts during revision surgery. This is likely to be a reflection on the risks associated with excising a well-incorporated graft,[5] especially in the absence of obvious periprosthetic fluid or pus.

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This article describes 3 cases of remnant prosthetic graft infection occurring after revision limb-salvage surgery for acutely occluded prosthetic grafts. A literature review on this topic is included. The focus of this article is on the role of complete and partial excision of the nonfunctioning graft in revision or limb-salvage surgery.

CASE REPORTS

Case 1

A 70-year-old female presented with an acutely ischemic left foot in September 2012. She had previously undergone an above-knee femoral-popliteal bypass with polytetrafluorethylene (PTFE) graft for intermittent claudication in 2006. She had no postoperative complications. She had a past medical history of type 2 diabetes, hypertension, and hemicolectomy.

On representation, she reported a 1-week history of a cold, painful paraesthetic left foot. Computed tomography angiography (CTA) showed thrombotic occlusion of the graft and popliteal artery. Catheter-directed graft thrombolysis with tissue plasminogen activator (tPA) (Bolus 5 mg, followed by 1 mg/hr tPA alteplase) and systemic intravenous heparin infusion were instituted but abandoned at 24 hr because of a failure to demonstrate any improvement in runoff or graft patency. Revascularization with in situ reversed long saphenous autogenous vein (LSV) graft was performed. The vein graft was anastomosed end-to-end to the common femoral artery (CFA) at its bifurcation, with the occluded superficial femoral artery divided and over sewn. The occluded PTFE graft was over sewn and left in situ. Distally, restoration of flow to the occluded tibioperoneal trunk and anterior tibial artery was achieved by Fogarty catheter thrombectomy. The vein graft was then anastomosed to the tibioperoneal trunk. The patient made an uncomplicated postoperative recovery and was discharged home 14 days later on warfarin.

Three months later she represented with nonhealing sinuses in her groin and medial thigh which were discharging purulent exudate, with cultures demonstrating Enterobacter cloacae. A CTA confirmed likely remnant graft infection, with pockets of gas surrounding the remnant PTFE graft. She underwent complete excision of the remnant graft from the medial thigh with complete debridement and betadine irrigation of surrounding infected tissues and delayed primary closure of the wound. At 9-month follow-up, she remained well with no evidence of further infection, patent vein graft, and intact peripheral pulses.

Case 2

A 76-year-old gentlemen presented with an acutely ischemic left leg in March 2012. He had undergone a below-knee femoral-popliteal bypass with a PTFE graft for short-distance intermittent claudication in September 2011. His graft surveillance raised no concerns before his readmission 6 months later. He had a past medical history of type 2 diabetes, hypertension, and ischemic heart disease.

He reported a sudden onset of a cold, painful left leg. Arterial duplex confirmed acute graft occlusion. Attempts at catheter-directed thrombolysis with tPA (5 mg bolus, 1 mg/hr for 24 hr) and systemic intravenous Heparin infusion were unsuccessful. Following angiography at 24 hr, a distal peroneal artery was considered to be patent in the distal calf and surgical bypass attempted. On exposing the peroneal artery, this was found to be unsuitable for bypass grafting throughout its length. On-table angiogram showed no other appropriate runoff vessels and no limb-salvage operation could be undertaken. A deferred primary above-knee amputation was performed with the old PTFE graft ligated and left in situ.

At 3 weeks, a persistent discharging sinus with pus at the amputation stump suture line had developed in an otherwise well-healed wound. The patient was started on antimicrobials based on cultures, which had grown Klebsiella pneumoniae. The likely source of infection was considered to be the occluded remnant PTFE graft. The sinus and discharge persisted despite a prolonged course of antibiotics, mandating excision of this infected remnant PTFE graft. The anastomosis between the native CFA and PTFE graft was excised and a vein patch was used to reconstruct the CFA in the groin. Extensive debridement of surrounding infected tissue was performed. The patient made an unremarkable recovery postoperatively and remains ambulatory at 12-month follow-up with a healed amputation stump and well-functioning prosthetic limb with no further evidence of on-going infection.

Case 3

A 71-year-old man presented with pus discharging from previous operative scar below the knee in January 2013. His past medical history was unremarkable apart from the described prior vascular surgery.

He had undergone an urgent femoral-tibioperoneal trunk bypass with a PTFE graft for an acutely ischemic leg secondary to a thrombosed popliteal artery aneurysm in October 2011. His postoperative course was unremarkable and he was discharged on warfarin anticoagulation. Interval graft surveillance at 3 months was entirely satisfactory. He represented 5 months later with an acutely ischemic limb secondary to acute thrombosis of the graft. He was started on intravenous heparin infusion and underwent an emergency femoral artery to peroneal artery bypass with in situ autogenous LSV graft. The proximal anastomosis was spliced end-to-end onto the PTFE cuff adjoining the CFA. The thrombosed PTFE graft was left in situ. He made a good recovery and was discharged after 11 days.

Ten months later, he was admitted with pus discharging from the leg through a medial calf sinus, which did not respond to a prolonged course of antibiotics. He