Successful Thrombolysis of a Chronically Occluded Femoropopliteal Synthetic Bypass Graft via the Popliteal Approach: Case Report

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Abstract. Thrombolysis of an occluded femoropopliteal synthetic bypass graft was performed via the popliteal artery approach for infusion catheter placement and urokinase delivery. Graft thrombolysis was achieved without complication. The proximal graft anastomosis could not be identified and prevented selective antegrade catheter placement and infusion. Because the distal graft anastomosis was visualized, the percutaneous popliteal approach was used. Subsequently, angioplasty was performed of an unmasked stenosis that presumably led to graft closure. We can conclude that selective thrombolysis via catheter placed from popliteal thrombolysis is an effective technique for recanalization of occluded femoropopliteal bypass grafts if the antegrade approach is not feasible.

Key words: Thrombolytic therapy—Vascular graft occlusion—Popliteal artery approach—Peripheral angioplasty

Thrombolytic therapy by urokinase infusions is an accepted therapy for peripheral vascular occlusions, and is most effective when it is selectively administered within the occluded vessel [1–3]. This requires direct catheter introduction into the thrombus, which is usually accomplished by antegrade (downstream) placement. We present a case in which the downstream approach was considered impractical and retrograde popliteal catheterization was employed successfully.

Case Report

A 68-year-old man underwent a repeat left femoropopliteal synthetic (Gortex) bypass graft 5 years ago which occluded shortly thereafter. Streptokinase infusion restored graft patency and resolved his symptoms. However, his claudication recurred within 1 year despite aspirin and coumadin therapy. One year ago, angiography documented both femoropopliteal graft and superficial femoral artery occlusions. An attempted laser-assisted ('hot tip') angioplasty failed to recanalize the occluded superficial femoral artery.

Prior to this admission, repeat angiography confirmed the superficial femoral artery occlusion, and the femoropopliteal graft to be occluded at its origin. Only the distal graft anastomosis was visualized by the profunda collaterals to the popliteal artery (Fig. 1). The popliteal artery was of normal caliber (4–5 mm) and there was normal, three-vessel, below-the-knee runoff. As the proximal graft anastomosis could not be identified, retrograde percutaneous popliteal cannulation was performed using a published roadmapping technique [4]. After puncturing the posterior wall of the popliteal artery, a guidewire was inserted and a 6 French sheath was placed. Heparin (5,000 U) was given. A 0.035 inch Glidewire (Terumo, Tokyo, Japan) was advanced from the popliteal artery into the occluded femoropopliteal graft. A 5 French straight catheter was advanced through and beyond the proximal anastomosis into the common femoral artery.

Cineangiography documented multiple intraluminal filling defects extending the graft’s length (Fig. 2). No contrast was seen extravasating from the graft or the popliteal artery cannulation site. The catheter was positioned distal to the proximal graft anastomosis, and boluses of heparin (5,000 U) and urokinase (100,000 U) were given. A urokinase infusion (2,000 U/min) continued for 18 h. Cineangiography revealed resolution of all intraluminal filling defects and a proximal anatomic stenosis (Fig. 3); this stenosis was opened by balloon angioplasty (Fig. 4). The infusion was stopped. There was no evidence of distal embolization. The popliteal sheath was removed, and the patient was discharged, within 24 h, with a palpable pedal pulse.

Discussion

In the present case, the proximal graft anastomosis could not be identified using multiple oblique views. This would have made selective antegrade intragraft
Fig. 1. Left femoral digital subtraction angiography (DSA) demonstrating flush occlusion of the femoropopliteal graft and the short graft stump at distal anastomosis. The native superficial femoral artery is occluded. The popliteal artery reconstitutes from profunda femoris collaterals. The angiogram was obtained with catheter placement in the aorta.

Fig. 2. Retrograde prone arteriogram of the femoropopliteal graft after catheter placement from the popliteal artery before thrombolytic therapy and percutaneous transluminal angioplasty (PTA). A stenosis and thrombus are visualized at the origin of the femoropopliteal graft, as well as thrombus in the graft body and at the distal anastomosis. Angiography was obtained through the popliteal catheter, with contrast being injected into the proximal graft.

Fig. 3. Retrograde prone arteriogram of the proximal femoropopliteal graft after thrombolytic therapy delineates the stenosis demarcated at the origin of the graft. Thrombus is no longer angiographically apparent.

Fig. 4. Composite DSA of the femoropopliteal graft following PTA shows resolution of the stenosis and restoration of normal flow. The angiographic catheter was positioned in the abdominal aorta.

catheter placement utilizing the brachial, axillary, or contralateral femoral artery approach difficult. Though an infusion catheter could have been selectively placed into the common femoral artery, this position would have significantly reduced the efficacy of thrombolytic infusion because of the preferential blood flow carrying the lytic agent into the profunda femoral artery.

In contrast to the proximal graft anastomosis, the distal popliteal artery anastomosis was angiographically well visualized. The popliteal artery was of normal caliber and the tibioperoneal vessels were normal. The site of popliteal artery cannulation would have been surgically approachable for embolectomy, or grafting in the event of a popliteal artery complication, or unsuccessful thrombolysis.

By contrast injection into the common femoral artery, the guidewire and catheter were easily directed into the graft which enabled cannulation and infusion catheter advancement over a guidewire to the proximal graft anastomosis. This catheter position allowed the infused urokinase to traverse down the length of the clotted graft. Ultimately, a proximal graft anastomotic stenosis, which presumably led to graft closure, was unmasked and abolished with angioplasty.

The popliteal approach for superficial femoral artery angioplasty is not novel and has been well described [4, 5]. This report is, to our knowledge, the first on the use of the popliteal approach for thrombolytic infusion. This approach is not without potential complications. Because there is a possible leakage of blood into the popliteal fossa, the cannulation technique itself is important, as is the size of the infusion equipment. The arterial sheath or infusion catheter in place should permit blood flow into the tibioperoneal