

Simultaneous femoro-popliteal artery bypass and foot free flap for lower limb salvage: a 13-year follow-up

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journals.sagepub.com/home/imr**Marius M Fodor¹**  and **Lucian Fodor²** 

Abstract

Critical limb ischemia (CLI) associated with lower extremity complex wounds is challenging for vascular and plastic surgeons. Despite a high risk of perioperative morbidity, complex reconstructive surgery in these patients is an alternative to primary major limb amputation. We present a patient with CLI and a complex foot wound treated with simultaneous femoro-popliteal arterial bypass and free flap for lower limb salvage. The 13-year follow-up showed good functional results.

Keywords

Critical ischemia, bypass, free flap, reconstruction, limb salvage, complex lower extremity wound

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Introduction

Patients with critical limb ischemia (CLI) often also have associated chronic necrotic wounds. The key to success in these cases is to control possible wound infection and to offer a good blood supply for healing. Chou et al.¹ recommended early revascularization (open or endovascular) and aggressive wound debridement followed by soft tissue reconstruction when treating CLI.

Complex lower extremity wounds in patients with CLI are challenging for plastic

surgeons. Any local or regional flap in a poorly vascularized area is risky, and skin grafts are not an option for weight-bearing

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areas or for exposed structures (bone, tendon, nerves). In these situations, flaps are recommended; however, good recipient vessels are essential. Major amputation of a primary limb is an alternative treatment in patients with extensive necrotic tissue, but the quality of life is unacceptable for most patients.

Herein, we report a patient who underwent simultaneous femoro-popliteal arterial bypass and split latissimus free flap for lower extremity salvage, with a 13-year follow-up.

Case Report

A 70-year old male patient was admitted to hospital with right CLI (Rutherford class 6) and a necrotic wound on the heel and hind-foot (Figure 1). He experienced resting pain for several months. Emergency digital subtraction angiography (DSA) was performed and revealed multiple occlusions of bilateral iliac arteries, and occlusion of the right superficial femoral artery with patency of the anterior tibial artery.

Upon admission to hospital, the patient was evaluated under anesthesia, and the wound was debrided. The treatment options were explained, and he chose reconstruction versus thigh amputation. The



Figure 1. The necrotic wound on the patient's hindfoot on admission.

patient had a history of aorto-bifemoral bypass performed in a different hospital. In our hospital, he underwent simultaneous femoro-popliteal bypass with a reversed homolateral vein graft and free flap for wound coverage (Figure 2a, b, c).

During surgery, the patient was placed 45-degrees toward the left side to allow simultaneous vascular and plastic surgery teams to work together. While the bypass was performed to re-permeabilize the anterior tibial artery, the anterior tibial vessels were prepared, and the split latissimus dorsi muscle flap was harvested (Figure 3a). The artery was palpated to find a suitable spot between the hard plaques in the distal tibial artery, and an end-to-side anastomosis was performed to the artery and end-to-end to the concomitant vein. A skin graft was then placed over the muscle. Surgery duration was 6.5 hours. We used one syringe of enoxaparin sodium 40 mg/0.4 mL/day as an anticoagulant agent and aspirin 75 mg/day as an antiaggregant agent. The flap was managed locally with sterile Vaseline dressings (Covidien, Mansfield, MA, USA) until healing.

The patient was discharged 3 weeks after surgery. His postoperative course was uneventful, and the graft healed well (Figure 3b, c).

The follow-up period was 13 years. Permeability of the femoro-popliteal artery bypass and the microvascular anastomosis to the anterior tibial artery were confirmed by computed tomography angiography (CTA) performed 13 years postoperatively (Figure 4).

Discussion

Cases of combined lower limb ischemia and complex wounds often require a “marriage” between vascular and plastic surgery for optimal treatment. A poor distal blood supply is a negative factor for wound healing and flap survival. Additionally, the hindfoot is a weight-bearing area and

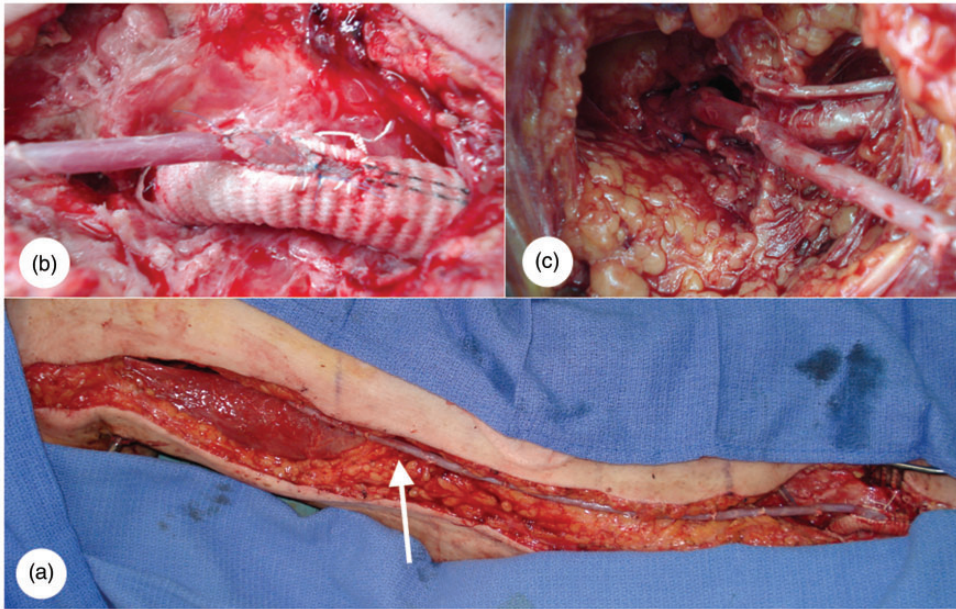


Figure 2. Femoro-popliteal arterial bypass. a. Femoro-popliteal arterial bypass with reversed vein conduit (arrow). b. The proximal anastomoses end to side to the prosthesis of the previous aorto-bifemoral arterial bypass. c. The distal anastomoses.

requires good coverage. There are two main categories for reconstruction: muscle flaps to offer good support, and fasciocutaneous flaps.² There are successful reports in the medical literature for both flap types, and the latissimus dorsi flap is one of the most common muscle flaps for foot reconstruction.² We preferred the split latissimus flap in this patient because of the defect size and to preserve the remaining muscle function.

In patients with CLI, some authors recommend performing the bypass or endovascular treatment first followed by free flap coverage.^{3,4} However, the published literature is limited regarding this type of treatment.^{5,6} The debate constitutes regarding whether to treat these patients using multi-stage operations or as a single-stage operation. We chose to perform simultaneous bypass and free flap reconstruction, but we found no previous reports

describing single-stage femoro-popliteal bypass and free flap reconstruction in the English literature. In a series of 76 patients, Randon et al.⁷ reported a strategy to connect the free flap artery directly to the distal anastomosis of the calf arterial bypass. However, early thromboses were reported in 29% of the patients, and numerous reinterventions were necessary.

There are two options for improved distal blood perfusion in patients with CLI: endovascular and open approaches (arterial bypass). The endovascular approach is suitable for limb arterial revascularization even with extensive necrotic foot lesions, but open surgery is preferred in cases of long-standing iliac and superficial femoral artery occlusion.⁸ In patients with CLI and complex foot defects, the reversed autologous vein instead of a prosthetic graft is preferred because the risk of

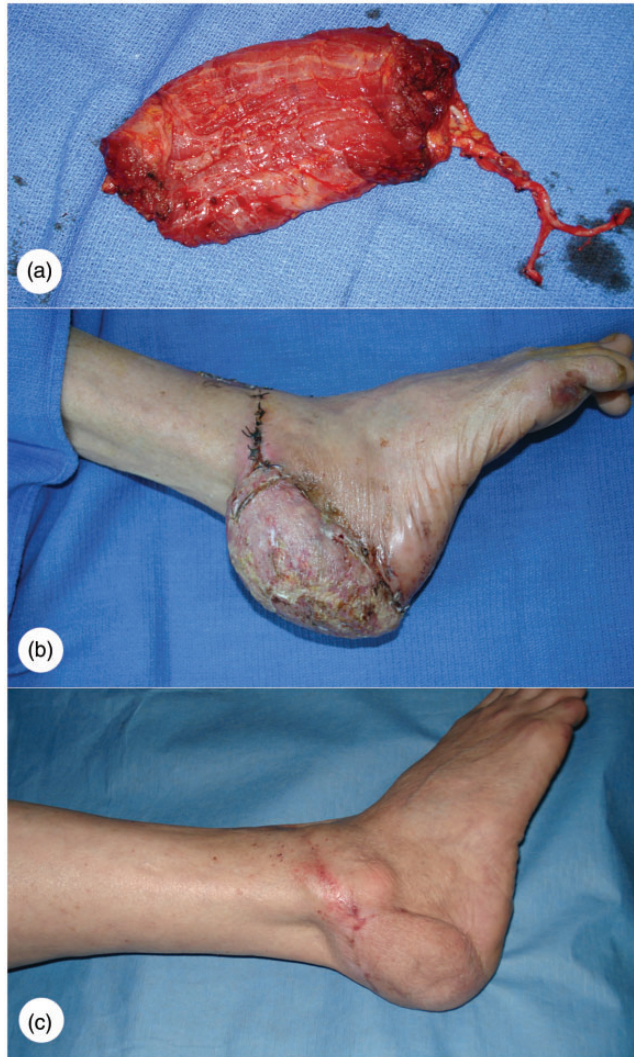


Figure 3. Free flap reconstruction. a. The split latissimus dorsi flap. b. Two weeks after surgery; notice the muscle mass. c. Three years after surgery; notice the shrinkage of the denervated muscle.

infection is lower, and long-term graft patency is greater with a vein graft.^{9,10}

In modern health systems, cost effectiveness and functional outcomes are important considerations. Despite the initial high cost of CLI treatment, the expenses associated with the long-term follow-up of patients who undergo arterial reconstruction and

limb salvage are lower.¹¹ Furthermore, quality of life is better in patients who undergo arterial reconstruction and free flaps compared with primary major amputation.¹²

In conclusion, single-stage vascular and plastic surgery reconstruction (arterial bypass and free tissue transfer) is a feasible

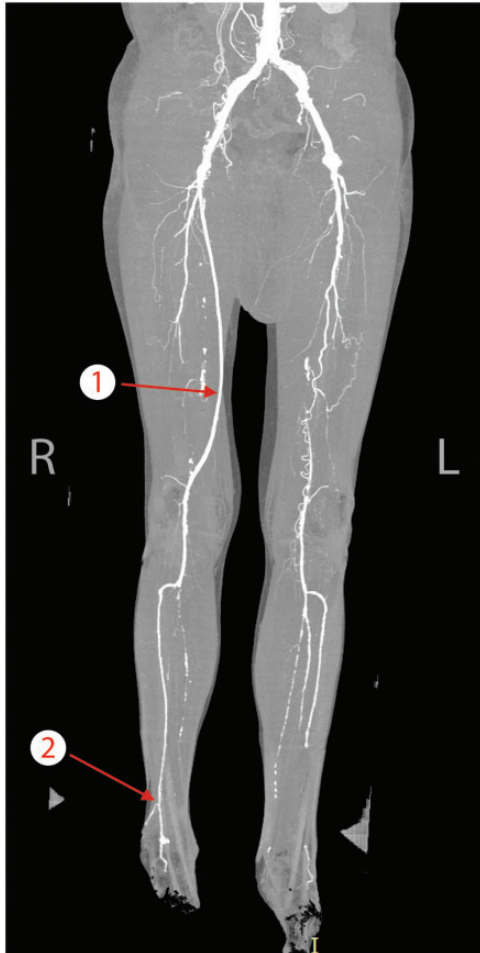


Figure 4. Computed tomography angiography (CTA) performed 13 years post-reconstruction. Note the permeability of the femoro-popliteal artery bypass (arrow 1) and the arterial microvascular anastomosis to the anterior tibial artery (arrow 2).

method for lower limb salvage in patients with CLI.

Ethics statement

Our institutional ethics committee waived the need for approval for this case report because the patient's details are protected and because this was a single case. Patient consent was not required for the same reasons.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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