An Axillary-Popliteal Artery Bypass Using PROPATEN® for Critical Limb Ischemia Due to an Extremely Long Chronic Total Occlusion: A Case Report

Soichiro Fukushima**, Naoki Toya¹, Kota Shukuzawa¹, Tadashi Akiba², Yuji Kanaoka² and Takao Ohki³

¹Department of Vascular Surgery, Jikei University Kashiwa Hospital, Japan
²Department of Surgery, Jikei University Kashiwa Hospital, Japan
³Department of Vascular Surgery, Jikei University School of Medicine, Japan

Abstract

Background: Extra-anatomic bypass is a less invasive treatment option of surgical revascularization for high risk critical limb ischemia (CLI), but it is thought to be difficult to keep the patency for longer term. We experienced a CLI case due to an extremely long chronic total occlusion extending from the infrarenal abdominal aorta to the superficial femoral artery, and succeeded limb salvage by an axillary-popliteal artery bypass using a PROPATEN®, heparin bonded ePTFE graft, with double antiplatelet therapy. A long extra-anatomic bypass has low patency rate for longer term, but we can maintain the patency over 20 months without any target lesion revascularization. We report a rare case with some literatures.

Case Presentation: An 83 years-old man complained of rest leg pain, and he was diagnosed as CLI due to a long chronic total occlusion extending from the infrarenal abdominal aorta to the superficial femoral artery. Because he had received several times of surgeries for cancers, and also he had poor vein graft conditions, we selected an extra-anatomic bypass using a PROPATEN®. We succeeded limb salvage, and are able to keep the patency without any target lesion revascularization over 20 months.

Conclusion: An extremely long axillary-popliteal bypass using a PROPATEN® is not a gold standard treatment for CLI, but it may be one of an alternative option only for high risk patient.

Keywords: CLI; Surgical revascularization; Aortic occlusive disease; Axillary-popliteal artery bypass; PROPATEN®

Introduction

The standard treatment for critical limb ischemia (CLI) is surgical revascularization (SR) using autologous vein grafts. However, it can be difficult to actually perform standard SR with autologous veins for CLI patients, because they have often already undergone coronary revascularization using autologous veins, or they often have poor vein graft conditions. We experienced a CLI case due to an extremely long chronic total occlusion (CTO) extending from the infrarenal femoral artery to the superficial femoral artery, with poor vein graft condition. An anatomical revascularization by laparotomy, or the surgical revascularization using autologous vein graft could not be applicable because of the patient’s conditions, we treated by an axillary-popliteal artery bypass using a PROPATEN® (W.L.Gore & Associates, Inc. Arizona, USA) heparin-bonded ePTFE graft. Although it seems to be difficult to keep the patency in such extremely long extra-anatomical bypass, the PROPATEN® maintain the patency over 20 months after procedure without any target lesion revascularization (TLR) with double antiplatelet therapy. It may be one of an alternative option only for high risk CLI patient to use the PROPATEN® for long extra anatomical bypass instead of the standard SR. We report the case with discussion of the relevant literature.

Case Presentation

In November 2014, an 83-year-old man consulted to our department with coldness, pallor, and rest pain of the left leg. He had a past medical histories of the bladder cancer (total cystectomy and iliac conduit diversion), rectal cancer (low anterior resection), and lung cancer (right upper lobectomy),
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and also he had a smoking history of 20 cigarettes/day × 60 years. His ankle brachial pressure index (ABI) was 0.47 in the right, and 0.35 in the left. Hematology and biochemistry tests revealed no abnormal data. Contrast-enhanced computed tomography scans (CT) revealed chronic total occlusion (CTO) of the infrarenal abdominal aorta, bilateral common and external iliac arteries, common and superficial femoral arteries with severe calcifications. Because radiological examination showed a decrease in enhancement of the deep femoral artery via collateral flow into the left leg, we decided to perform angiography and prompt revascularization.

Pre-operative angiograph via the left brachial artery showed a long CTO as previous enhanced CT scans. In the left limb, the deep femoral artery was occluded at its origin, and the above-knee popliteal artery was visualized via the collateral blood flow in the delayed phase, and distal run-off was relatively maintained (Figures 1A-1C). This patient was elderly, and his backgrounds strongly demanded that the less invasive treatment should be selected. Therefore, we did not attempt anatomical revascularization by laparotomy, but instead performed non-anatomical revascularization using the left axillary artery and the left above-knee popliteal artery as the inflow and outflow vessels, respectively. Because the condition of the saphenous vein was poor in both legs, we decided to use a ringed PROPATEN® graft for revascularization.

The axillary artery and the above knee popliteal artery were exposed as usual manner, and the bypass surgery was done using a single 8 mm × 80 cm PROPATEN® graft. The graft was passed through a subcutaneous tunnel from below the pectoral major muscle to the inguinal ligament, while it ran under the femoral fascia below the inguinal ligament. After anastomosis, angiography showed the blood flow through the bypass was satisfactory and blood flow in the leg had improved (Figure 2). His postoperative course was uneventful. Coldness and rest pain in the left leg resolved. The ABI of the treated leg improved to 0.61, and the patient was ambulatory when discharged from hospital at 8 days postoperatively. Postoperative CT clearly visualized distal blood flow in the left foot via the bypass (Figure 3), and the revascularized graft is still patent more than 20 months after surgery.

Discussion

In the treatment of PAD, the indications for endovascular therapy (EVT) have continued to increase over time. SR used to be the
treatment of first choice for TASC C-D lesions of the femoropopliteal region, but in July 2012, based on the results of a Japan-U.S. collaborative international study, a paclitaxel-eluting superficial femoral artery stent (Zilver PTX) [1,2] was approved in Japan in compliance with the Pharmaceutical Affairs Law. And various devices for treating leg lesions, such as Viabahn® heparin-bonded covered stent for long/diffuse lesions of the superficial femoral artery [3,4], drug-eluting balloons, [5,6] have also been developed. According to these new devices, better results have been obtained by EVT and this therapy is now indicated for a wider range of conditions.

However, SR is still the gold standard for revascularization in CLI patients requiring revascularization of the leg often have preoperative coronary artery disease, and their condition of vein graft is often unfavorable. The postoperative course in this patient suggests that the revascularization by an extra-anatomical bypass using the PROPATEN® graft with double antiplatelet therapy can be a useful alternative to SR for CLI patients, in whom it is difficult to perform revascularization with autologous veins. However, it is necessary to conduct further studies of long-term postoperative graft patency in CLI patients to confirm the findings obtained in the present case.

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References

