An Extreme Recanalization: Transcollateral Retrograde Wiring for Below-the-ankle Occlusive Lesion

Tatsuya Nakama *, Yoshisato Shibata, Kenji Ogata, Nehiro Kuriyama

Department of Cardiology, Miyazaki Medical Association Hospital, Miyazaki City, Japan

INTRODUCTION

Endovascular therapy (EVT) is widely used for limb salvage in critical limb ischemia (CLI). In particular, infrapopliteal recanalization is often necessary because many CLI patients present with complex below-the-knee (BTK) disease, and, on occasion, also with below-the-ankle (BTA) disease. Although the existence of BTA disease is an independent predictor of major amputation, recanalization techniques for BTA disease have not been standardized. In this article, we propose an alternative recanalization technique, namely a transcollateral approach for BTA occlusion.

REPORT

A diabetic man in his 70s was admitted to our hospital because of a non-healed ulcer of the fourth toe (Fig. 1A). The baseline angiogram revealed an extensive BTK lesion; occluded tibioperoneal trunk (TPT), and anterior tibial (ATA) and dorsalis pedis arteries; severe stenosis of the posterior tibial (PTA) and peroneal arteries; and intact medial plantar artery (MP), but occluded lateral plantar artery (LP) (Fig. 1C,D). The patient underwent successful EVT for TPT and PTA. However, after 1 month, the ulcer persisted; we had achieved “in line” direct flow to the fourth toe. Because the angiogram for the fourth toe corresponded to LP and not MP, we performed additional EVT of the occluded LP to achieve “in line” direct flow to the fourth toe.

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A 5F 60-cm sheath (Medikit, Tokyo, Japan) was inserted from the ipsilateral femoral artery antegradely. Unfractionated heparin (5000 IU) was injected. The baseline angiogram for the second procedure was almost the same as the final angiogram for the first procedure. For EVT of the occluded LP, we first attempted to cross the occlusion with a 0.014-inch Miracle 12 (ASAHI INTEC, Aichi, Japan), but failed. A retrograde approach through a well-developed collateral channel from the MP to the LP was then attempted (Fig. 1C,D). The hydrophilic coated plastic jacketed 0.014-inch retrograde Regalia XS1.0 guidewire (ASAHI INTEC) was carefully advanced into the well-developed collateral channel with the back-up support of a 1.8F Prominent microcatheter (Tokai Medical Products, Aichi, Japan). When the Prominent tip reached the middle part of the collateral, the Regalia XS1.0 was removed and the collateral channel was visualized by tip injection of contrast medium (Fig. 2A,B). Several tip injections were necessary for transcollateral wiring because of accordion phenomenon-related changes in collateral channel shape. Careful wiring continued and finally achieved successful passage to the distal true lumen of the LP beyond the tortuous collateral channel. Tip injection revealed tapering of the retrograde stump of the occlusive LP. Bidirectional wiring and the wire rendezvous technique allowed crossing of the guidewire though the occluded LP (Fig. 2C,D), which was then dilated with a 2.0 × 120 mm balloon (Amphirion Deep, Medtronic, Minneapolis, MN, USA; Fig. 2E). The LP was fairly opened in the second procedure (Fig. 2F,G). After 3 weeks, the ulcer had begun to heal (Fig. 1B) and the patient was discharged.

DISCUSSION

In this article, we report on additional recanalization of a BTA artery to achieve “in line” direct revascularization.
Because of poor artery-to-artery connection, the intact MP could not supply sufficient flow for wound healing. In this case, “in line” angiosome-based direct recanalization was needed for foot salvage. The retrograde approach is important in such complex EVT. Although there have been reports on transcollateral retrograde wiring for BTK lesions, the technical ease of distal puncture has discouraged its broader use. However, the therapeutic strategy has been standardized for BTA occlusive lesions. Metatarsal or pedal puncture for retrograde access has been reported; however, these access sites are quite extreme and technically challenging. In such cases, transcollateral retrograde access

Figure 1. A diabetic man in his 70s was admitted to our hospital because of a non-healing ulcer on the fourth toe (1A). This patient underwent successful endovascular therapy (EVT) for occluded tibioperoneal trunk and stenotic posterior tibial artery. However, after 1 month, his ulcer persisted. The final angiogram revealed an intact medial plantar artery but occlude lateral plantar artery (1C,D). We decided to perform an additional intervention for his occluded lateral plantar artery to achieve “in line” direct flow to the fourth toe. Three weeks after successful EVT for an occluded lateral plantar artery, the ulcer had begun to heal (1C) and the patient was discharged.

Figure 2. A 0.014-inch chronic total occlusion guidewire (Miracle12, ASAHI INTEC, Aichi, Japan) failed to cross the lesion antegradely. A well-developed collateral channel from the medial plantar artery to lateral plantar artery was used for the retrograde approach. The hydrophilic coated plastic-jacketed 0.014-inch retrograde Regalia XS1.0 guidewire (ASAHI INTEC, Aichi, Japan) was carefully advanced into the channel with the back-up support of a 1.8F Prominent microcatheter (Tokai Medical Products, Aichi, Japan). When the Prominent tip reached the middle part of the collateral channel, the guidewire was removed and the collateral channel was visualized by tip injection of contrast medium (A,B). Finally, the retrograde guidewire crossed the tortuous collateral channel. After collateral channel tracking, we performed bidirectional wiring and finally achieved successful guidewire passage (1: retrograde guidewire through the collateral channel, 2: tip of the retrograde guidewire, 3: antegrade guidewire). After the achieving successful guidewire crossing, we dilated the lateral plantar artery (E) with 2.0 × 120 mm balloon catheter (Amphirion Deep, Medtronic, Minneapolis, MN, USA) at 6 atm for 3 minutes. The lateral plantar artery was fairly opened in the second procedure (F,G).
might be an important option. This procedure certainly has an associated risk of collateral channel injury (perforation and dissection), and careful guidewire manipulation is very important to prevent complications. When channel injury occurs, channel collapsing with negative pressure from the microcatheter and super selective sodium nitroprusside injection is effective. We propose the procedure presented here as an important optional technique for BTA interventions.

CONFLICT OF INTEREST
None.

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REFERENCES