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Case report

Endovascular treatment for chronic total occlusion of superficial femoral artery: Is retrograde approach from popliteal artery effective and safe? ☆

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ABSTRACT

A 55-year-old male was admitted with numbness in the left foot and intermittent claudication. Doppler ultrasound and digital subtraction angiography presented chronic total occlusion in the ostial of left superficial femoral artery and reperfusion flow at one-third below from collateral channels of deep femoral artery. Thus, we decided to perform an endovascular intervention for this patient. First, we used contralateral transfemoral approach technique, but the microwire could not reach to the occluded superficial femoral artery lesion. Then, we approached the chronic total occlusion lesion retrogradely. A wire was passed successfully from the popliteal artery to ostial superficial femoral artery. Finally, 2 stents were implanted. This case highlights that popliteal retrograde approach is effective and safe for total occlusion of superficial femoral artery.

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Introduction

Intervention endovascular treatment (EVT) is a good choice in treating chronic total occlusion of the superficial femoral artery (SFA). The initial success rate of this therapeutics was reported between 81% and 94% recently [1] as compared with 75% in 2001 [2]. Among the 2 ways of approaching the lesion

(antegrade or retrograde), the retrograde approach is less commonly utilized [3]. In some cases, antegrade access can be difficult, so we must manage by the retrograde approach as an alternative way. We herein report a case of completely patency endovascular of the SFA using retrograde approach from the popliteal artery after failing with antegrade access and provide a reference to improve understandings of endovascular intervention for chronic total occlusion of SFA.

Abbreviations: EVT, endovascular treatment; SFA, superficial femoral artery; ABI, ankle-brachial index; TASC, Trans-Atlantic Inter-Society Consensus.

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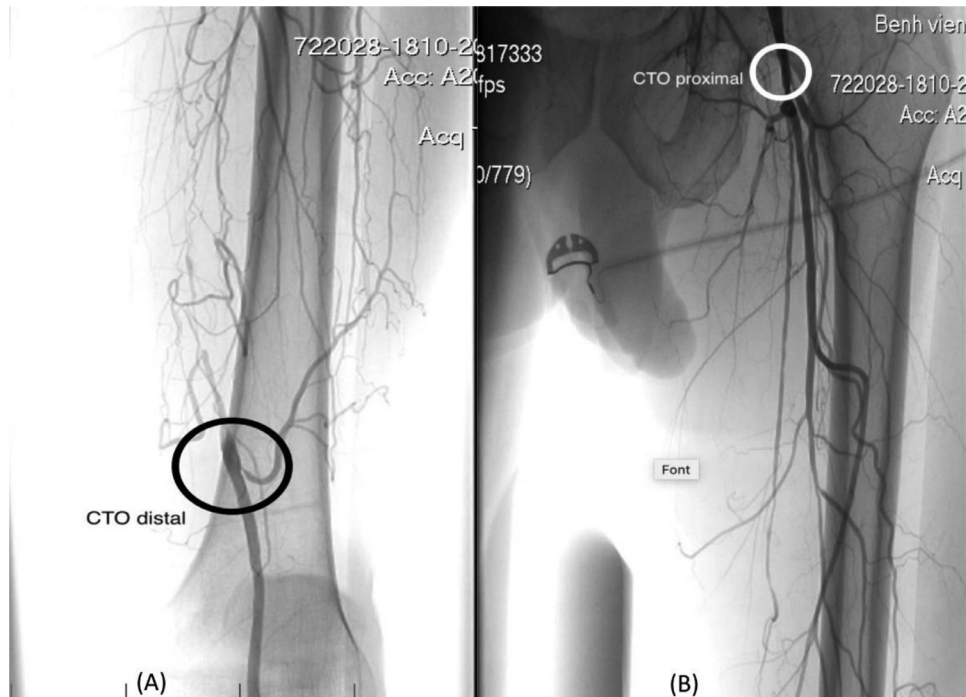


Fig. 1 – Angiography of left superficial femoral artery. (A) Angiography showed a chronic total occlusion at the proximal portion of left SFA. (B) Collateral channels developed from the deep femoral artery to distal SFA. CTO: chronic total occlusion.

Case report

A 55-year-old male was hospitalized with symptoms of claudication of lower extremities when he was walking about 100 meters and numbness of the left foot. The history of this patient was known for diabetes type 2 and hypertension. He was in grade I-3, according to The Rutherford classification. He was given Cilostazole, Aspirin, Rosuvastatin, Insulin, and Perindopril. He was measured the ankle-brachial index with his right and left ankle-brachial index as 0.8 and 0.55, respectively. Doppler ultrasound and digital subtraction angiography results showed that his left SFA was chronic total occlusion at proximal partial, and collateral circulation came from the left deep femoral artery to distal SFA and reperfusion flow at one-third below of SFA (Fig. 1). Although he was treatment optimal with medications, his symptom was not improved. According to Trans-Atlantic Inter-Society Consensus (TASC) II classification, the lesion of SFA was classified as TASC D. We discussed with cardiovascular surgeons about indications of revascularization therapy for this patient. Recent studies showed the initial success rate and secondary patency rate of endovascular intervention are similar to femoropopliteal bypass using a vascular graft. Furthermore, patients with TASC C and D, which were performed femoropopliteal bypass, have higher complications than endovascular intervention treatment [1].

We performed EVT to chronic total occlusion of left SFA. A 6F sheath was inserted in the right femoral artery. Angiography showed a chronic total occlusion of proximal SFA and collateral channels raised to distal SFA from deep femoral

artery. We used 0.010" guide wire and 0.009" microwire, but the microwires did not approach to the true lumen of distal SFA. Therefore, we approached distal SFA from left popliteal artery with a retrograde technique. We put a 6F sheath into left popliteal artery under digital subtraction angiography imaging, and then, we used 0.035" straight guide wire with Multipurpose 4F catheter to pass from distal to proximal SFA. We performed antegrade balloon dilation with balloon angioplasty 5.0 × 120 mm in the proximal SFA through distal SFA. Then, angiography showed revascularization flow in the proximal to distal of SFA and stenosis of SFA about 40%-50%. A self-expanding stent (7.0 × 170 mm) and a 6.0 × 150 mm stent were implanted in the proximal of SFA and in distal of SFA, respectively. Next, we performed the post dilatation with non-compliant balloon 6.0 × 120 mm under the pressure of 10 atm. The final angiography showed the successful revascularization of SFA with well-expanded stents (Fig. 2). The total time for the procedure was 2 hours. No complication was detected.

After intervention, the patient's symptom was quickly resolved. The pain and claudication were reduced at his left leg. There was no complication detected in the following days of admission, and the patient was discharged from our hospital after 3 days with adjusting the medical treatment with a high dose of statin, dual antiplatelet therapy, metformin, and an angiotensin-converting enzyme inhibitor.

We followed up the patient every month with Doppler ultrasound for patency assessment. The last examination (after 3 months) found the SFA still be well patented. No additional procedure has been required.

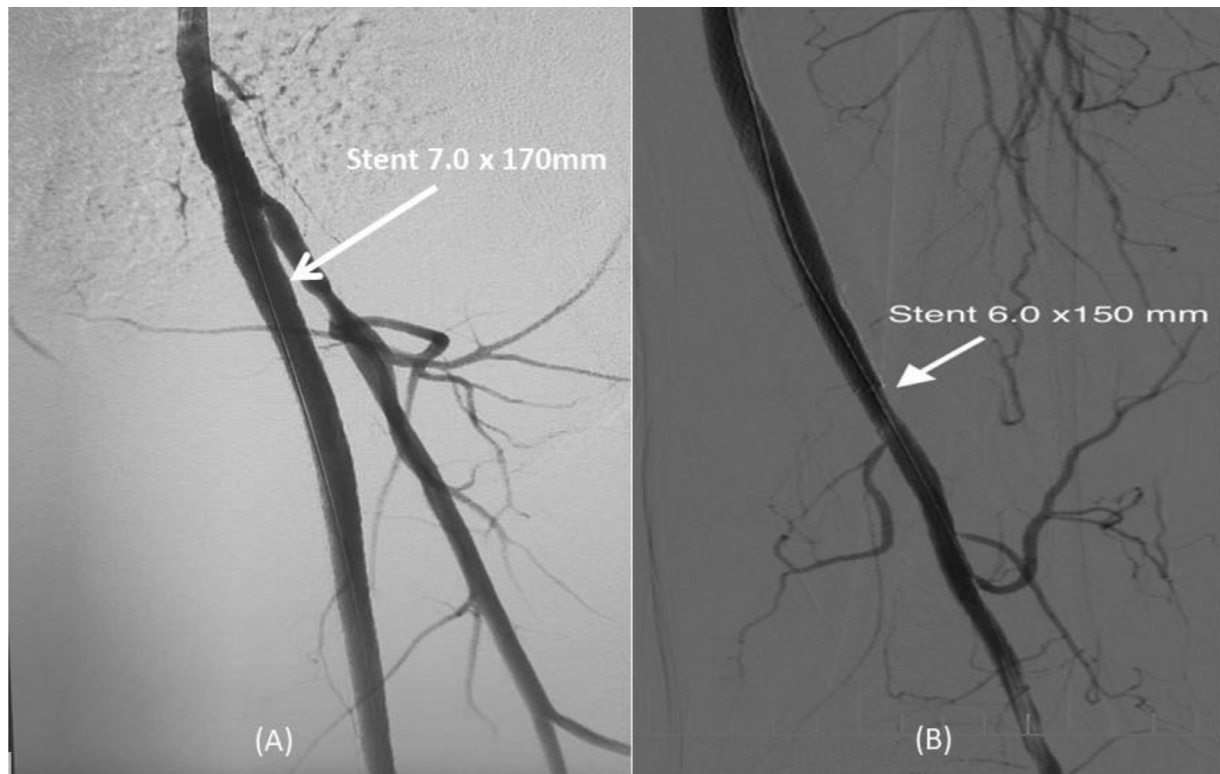


Fig. 2 – Implanting self-expanding stents. (A) A 7.0 x 170 mm stent was implanted in the proximal of left SFA. (B) A 6.0 x 150 mm stent was implanted in distal of left SFA. Final angiography showed the successful revascularization of SFA.

Discussion

Surgical femoropopliteal bypass is recommended in patients with SFA who are classified as TASC D [4]. However, recent studies have shown that high recanalization rates can be achieved by developing devices and procedures [5]. With regards to a recent study of femoral popliteal bypass in the symptomatic patients with TASC C and D, the 1-year and 5-year primary patency rate following the bypass surgery were 82.1% and 69.4%, while these rates were lower in EVT as 67.8% and 45.2%, respectively [6]. Referring to the secondary patency, the 1-year and 5-year rates were 93.2% and 79.5% in femoral popliteal bypass surgery group and 90.1% and 85.1% in EVT group, respectively [7]. Despite the lower primary patency rate in EVT group comparing with bypass surgery, EVT had similar rates with bypass surgery in the secondary patency result. The number of patients who undergo EVT has been increasing recently. Concerning the definition of chronic total occlusions of femoropopliteal artery, its long, diffuse, and even total occlusions often requires EVT. The antegrade approach is a preferable choice when we underwent the SFA intervention, and this procedure is performed using a contralateral retrograde of the femoral artery or an ipsilateral antegrade puncture [8]. The popliteal approach is often used as an alternatively plan when these above approaches are unfavorable or unsuccessful.

The retrograde technique was first reported 31 years ago [9], but might be not commonly used due to the risk of injuries of veins or nerves and extended puncture time on a

prone position [9,10]. These limitations have been improved recently by using echo-guided puncture devices, and they can be helpful in reducing injuries of the veins or nerves, as well as the puncture time on a prone position. Besides, a retrograde technique using deep femoral artery may damage collateral channels and result in a weak back-up force for penetrating chronic total occlusions lesions. If the puncture of popliteal arteries is easy with echo-guided device, a retrograde popliteal technique may be safer than a retrograde deep femoral artery approach we proposed. In the case of collateral artery is injured, there is a risk of ischemic limb. Therefore, F-P bypass is considered, if this procedure is failed.

At our center, we have performed numerous procedures of EVT to chronic total occlusion of SFA, and this is the first case who underwent retrograde approach from popliteal artery.

In conclusion, retrograde revascularization via a popliteal artery approach is effective and safe in treating chronic total occlusion of the SFA in case of failing with antegrade approach.

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