

Revascularization of superficial femoral artery due to chronic total occlusion: Collateral approach

Yüzeyel femoral arter tam tıkanıklığının revaskülarizasyonu: Kollateral yaklaşım

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Summary– Endovascular interventions are now used more frequently in the treatment of femoropopliteal occlusions, and antegrade passage through the occlusion is preferred as the first option. However, when antegrade passage fails for any of several reasons, retrograde, or less frequently, collateral passage may be used. Although collateral passage may present serious complications, it can be successfully applied in selected cases in experienced centers. In the present case, a superficial femoral artery occlusion was successfully opened with a collateral approach.

Approximately 40% of femoropopliteal lesions present as total occlusion. In cases of femoropopliteal chronic total occlusion, the first attempt is typically to pass the lesion with an antegrade approach, but this may fail or not be possible in cases such as a calcified lesion, in the presence of a wide collateral vessel, or if there is a lack of technical equipment. When an antegrade passage fails, retrograde, or less frequently, a collateral passage may be used. Although a collateral approach may present serious complications, this approach is minimally invasive, there is no need to reposition the patient, and no additional access is necessary.

CASE REPORT

A 70-year-old male presented with life-limiting claudication. The patient, who was receiving dialysis due to chronic renal failure, had undergone stent implantation to the left anterior descending artery 5 years earlier, to the right common iliac artery 3 years earlier, and peripheral artery bypass graft between the

Özet– Endovasküler girişimler femoro-popliteal lezyonların tedavisinde daha sık kullanılmakta olup önce tıkalı yerin öne doğru olarak geçilmesi tercih edilmektedir. Ancak öne doğru yol ile geçiş çeşitli nedenlerle başarısız olduğunda geriye doğru yol veya daha az sıklıkla kollateral yolla geçiş kullanılmaktadır. Kollateral yol ile geçişin ciddi komplikasyonları olmasına rağmen seçilmiş bazı olgularda ve deneyimli merkezlerde başarılı olarak uygulanabilmektedir. Bu olguda tıkalı femoral arter kollateral yol ile başarılı olarak açılmıştır.

right common femoral artery and the left common femoral artery 4 years earlier. Diagnostic peripheral angiography was performed. The patient had developed increased claudication, despite medical treatment, including a statin, cilostazol and acetylsalicylic acid, and participation in a gait program. Peripheral angiography revealed total occlusion in the right distal superficial femoral artery (SFA), filling of the popliteal artery from the collateral vessels originating from the distal SFA and weak flow in the distal arteries (Supplementary Video 1). He was referred for percutaneous revascularization of the right SFA. A 6-F sheath (Cordis Corp., Hialeah, FL, USA) was placed for an antegrade approach in the right SFA. After the administration of heparin, a 0.035-inch hydrophilic stiff body wire (Asahi Intecc USA, Inc., Tustin, CA) was advanced to the cap supporting a 5-F multipurpose catheter MPA-1 (Cordis Corp., Hialeah, FL, USA) and a Minnie supporting catheter (Vascular Solutions, Minneapolis, MN, USA). Multiple attempts were made to advance a Treasure 12 wire (Asahi In-

Abbreviation:

SFA Superficial femoral artery

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tecc USA, Inc., Tustin, CA) into the proximal cap, but they were unsuccessful. Transpedal retrograde intervention was planned; however, the puncture failed due to the weakness of the distal flow and the small size of the vessel lumen. The collateral vessel, which originated from the distal part of the right SFA and drained to the distal popliteal artery, was the next target for passage. A Fielder FC wire (Asahi Intecc USA, Inc., Tustin, CA) was passed collaterally and advanced to the occlusion. A Corsair catheter (Asahi Intecc USA, Inc., Tustin, CA) was then advanced over the wire. The Fielder wire was exchanged with a Grand Slam wire (Asahi Intecc USA, Inc., Tustin, CA). The Corsair catheter was retrieved and a 0.035-inch Minnie catheter was placed over the Grand Slam wire. The Grand Slam wire within the Minnie catheter was exchanged for 0.035-inch stiff hydrophilic wire (Asahi Intecc USA, Inc., Tustin, CA). True lumen was

accessed after a short subintimal passage using a loop technique with the 0.035-inch stiff hydrophilic wire supported by the Minnie catheter (Fig. 1). However, passage through the lesion was not successful because the Coyote (Boston Scientific, Corp., Marlborough, MA, USA) balloon was too long. The 0.035-inch hydrophilic wire was then exchanged with the Grand Slam wire once again. The occlusion area was inflated at 14 atm with a 4.0x20 mm coronary balloon. Then the lesion was inflated at 14 atm for 3 minutes with a 4.0x150 mm Coyote peripheral balloon (Supplementary Video 2). Final angiography demonstrated brisk flow without embolization or perforation (Fig. 2, supplementary Video 3).

DISCUSSION

Femoropopliteal lesions are the most common peripheral arterial interventions, accounting for approx-



Figure 1. (A) Superficial femoral artery occlusion; (B) Collateral flow (arrow) (C) Collateral flow (arrow); (D) Filling of popliteal artery with collateral flow (dashed arrow); (E) Fielder wire and Corsair catheter (Asahi Intecc USA, Inc., Tustin, CA) in the popliteal artery via collateral approach; (F) Corsair catheter in the popliteal artery.

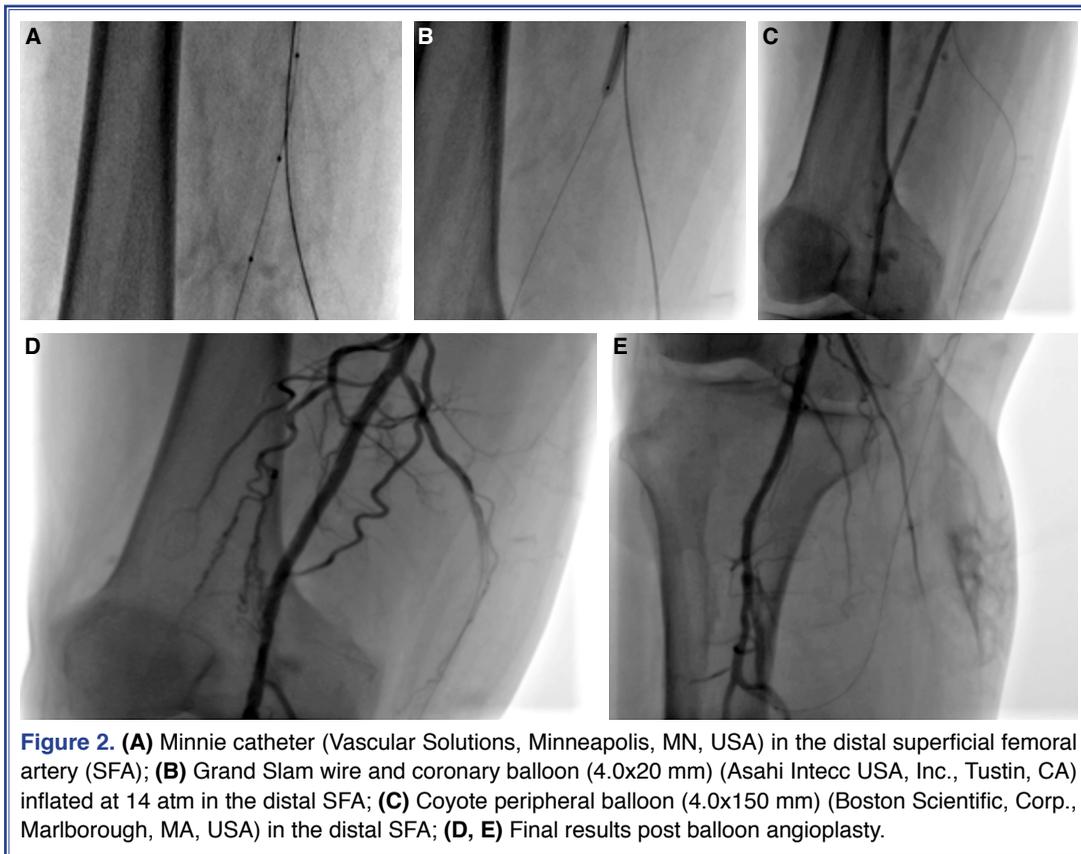


Figure 2. (A) Minnie catheter (Vascular Solutions, Minneapolis, MN, USA) in the distal superficial femoral artery (SFA); (B) Grand Slam wire and coronary balloon (4.0x20 mm) (Asahi Intecc USA, Inc., Tustin, CA) inflated at 14 atm in the distal SFA; (C) Coyote peripheral balloon (4.0x150 mm) (Boston Scientific, Corp., Marlborough, MA, USA) in the distal SFA; (D, E) Final results post balloon angioplasty.

imately 40% of total occlusions.^[1] Recent advances in stent and wire technology have increased the success of the procedure, enabling endovascular procedures to be used more widely. In cases of femoropopliteal chronic total occlusion, the first course of action is to pass a lesion using an antegrade method, but these attempts may fail in some cases, such as a calcified lesion, in the presence of a wide collateral vessel, or if there is a lack of technical equipment.^[2] When antegrade methods fail, popliteal, tibioperoneal, or transpedal trunks are used in a retrograde approach. The most important limitation of these interventions is that popliteal interventions require repositioning, causing an increased risk of bleeding after repositioning, and a tibioperoneal or transpedal trunk may create difficulties because of the small vessel lumen. Collateral vascular access may be an alternative when an antegrade procedure fails. This approach is minimally invasive, there is no need for repositioning of the patient, and additional access is not necessary.^[3,4] The most important advantage of this procedure is that the plaque in the distal region is of a soft nature and therefore has a greater chance of success with the collateral method. In the literature, SFA revasculariza-

tion has been successfully performed using collateral vessels in a small number of cases without complications.^[5,6] When this method is used, it is important to have a surgical team ready to reduce the risk of extremity loss through dissection or perforation of the collateral vessels that supply wide areas. The greatest limitation of this method is the technical difficulty of the wire passage due to the possibility of angulation and kinking of the collateral vessels. However, this difficulty has been minimized with the newly developed balloons, supportive catheters, and wires with a good passage profile.

It is advisable for interventional cardiologists to keep in mind that the profunda femoris collaterals may be used as an alternative when an antegrade method fails or in a case of dissection or flow impairment using an antegrade pathway.

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