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CASE REPORT

Direct stent puncture technique for recanalization of superficial femoral artery in-stent occlusion

Yüzeyel femoral arter stent oklüzyonunun rekanalizasyonu için direkt stent ponksiyonu tekniği

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Summary– In-stent restenosis and occlusion are common, well-known complications of superficial femoral artery (SFA) interventions. The treatment options in such cases are re-intervention or surgery. A percutaneous antegrade approach is an effective and safe method to perform SFA stent restenosis or occlusion treatment. If an antegrade intervention fails, a retrograde transpopliteal approach may be an alternative. However, in some patients who are admitted with acute leg ischemia there is no distal vessel flow. This condition can result in the need for extremity amputation. Presently described is a case in which a direct stent puncture technique was applied to recanalize the SFA in-stent occlusion after an initially unsuccessful antegrade intervention.

Özet– Stent restenozu ve oklüzyonu, yüzeyel femoral arter girişimlerinin yaygın ve iyi bilinen komplikasyonlarıdır. Bu durumlarda tedavi seçenekleri tekrar girişim veya cerrahidir. Perkütan antegrad yaklaşım, yüzeyel femoral arter stent restenozu ya da oklüzyonu tedavisinde etkili ve güvenli bir yöntemdir. Antegrad yaklaşım başarısız olduğunda, retrograd transpopliteal yaklaşım alternatif olarak kullanılabilir. Bununla birlikte, akut bacak iskemi kliniği ile başvuran bazı hastalarda distal damar akımı olmayabilir. Bu durum bu hastalarda ekstemite kaybı ile sonuçlanabilmektedir. Burada, başarısız antegrad girişim sonrası direkt stent ponksiyonu tekniğiyle rekanalize edilen yüzeyel femoral arter stent oklüzyonu olgusu sunduk.

Endovascular treatment of the superficial femoral artery (SFA) has been successfully performed as an alternative to surgery for a long time.[1] It has been demonstrated that the use of stents in the femoropopliteal tract has a high procedural success rate and comparatively few complications.[2] Although there have been advances in peripheral stent technology, in-stent restenosis and occlusion are still the most important issues in the long-term follow-up of endovascular stenting.[3,4] The procedural success of percutaneous re-intervention is low because recanalization of the occluded stent is very difficult.[5] Additionally, complications, such as vascular perforation, slow flow, and subintimal tendency, are commonly observed during re-intervention.[5] In cases that develop vascular complications or when antegrade intervention fails, alternative percutaneous techniques or surgery should be considered. A retrograde transpopliteal approach is preferred as a first alternative option in patients who have sufficient distal flow.[6,7] But a retrograde popliteal or tibialis posterior approach cannot be performed easily in patients who have no distal flow. Therefore, an invasive procedure becomes very difficult and complex when an antegrade approach fails. This is a description of the successful use of the direct stent puncture technique in a patient who had a long in-stent SFA occlusion without distal popliteal flow.

Abbreviation:

SFA Superficial femoral artery

CASE REPORT

A 67-year-old male patient presented at the clinic with left leg pain at rest (Rutherford class IV). His medical history included hypertension, diabetes mellitus, and chronic renal failure. He was also a current

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smoker. He had undergone a successful endovascular stenting of the SFA 2 years earlier. A physical examination revealed no palpable pulse in the left leg without the presence of any wound on the left foot. The angiographic study performed via the right common femoral access showed an occluded stent in left SFA (Fig. 1a). First, a 7-F Balkin sheath (Cook Medical Inc., Bloomington, IN, USA) was inserted into the right external iliac artery, and then a 0.035-inch hydrophilic guidewire (Radifocus; Terumo, Tokyo, Japan) inside the 0.035-inch hydrophilic support catheter (Glidecath; Terumo, Tokyo, Japan) was used to create a subintimal dissection above the level of the occluded stent. The wire inside the support catheter was then advanced to the distal occlusion site through the subintimal space. The guidewire did not advance through the true luminal space, and a vascular perforation was observed at the level of the occluded SFA stent. The wire was steadily advanced into the perforated segment; however, the antegrade approach failed. As there was no popliteal or infrapopliteal flow, a retrograde popliteal or tibialis posterior approach was not considered and a decision was made to perform a direct stent puncture. The occluded SFA stent was punctured at the level of the proximal part of the adductor canal with a 21-G micropuncture needle (Cook Medical Inc., Bloomington, IN, USA) under roadmap fluoroscopic guidance. The guidewire was advanced directly into the arterial lumen. The wire was then removed from the left femoral artery sheath lumen (Fig. 1b). The support catheter was advanced to the left SFA via this wire and passed into the true lumen of the occluded stent. Balloon dilatation was performed with a 5.0x150-mm balloon and 2 self-expanding nitinol stents (Supera Peripheral Stent System, 6x150 mm; Abbott Vascular, Inc., Santa Clara, CA, USA) were implanted in the left SFA. The final angiographic study demonstrated satisfactory flow in the left SFA and popliteal artery (Fig. 1c). There were no complications after procedure and the patient was

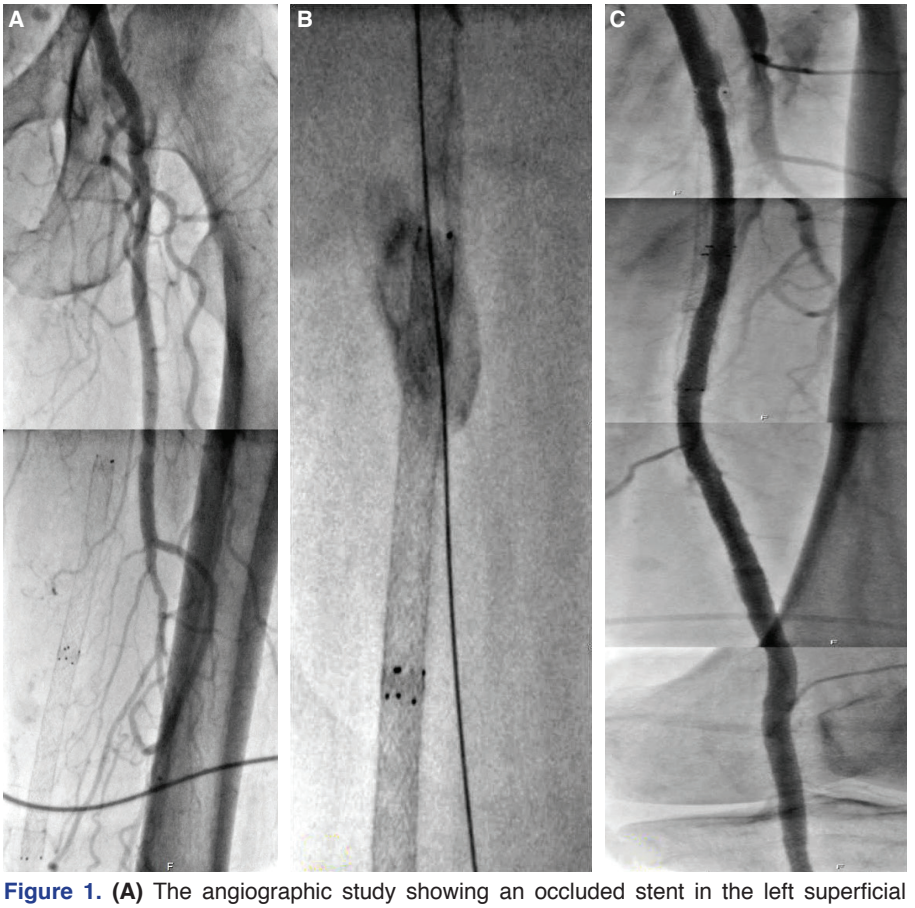


Figure 1. **(A)** The angiographic study showing an occluded stent in the left superficial femoral artery. **(B)** The wire penetrated the lumen after direct stent puncture and **(C)** the occluded stent was successfully revascularized.

discharged with optimal medical therapy. No claudication symptoms were observed at a routine 6-month control visit and a duplex scan illustrated patency of the SFA stents.

DISCUSSION

Endovascular stenting is a feasible alternative to bypass surgery in patients with femoropopliteal segment lesions.[8] But, in-stent occlusion is a common complication of endovascular SFA stenting and the management of such circumstances can be difficult.[9] These patients usually suffer recurrent extremity-threatening ischemia and severe claudication.[10] Therefore, they should be revascularized immediately for the extremity prevention . The therapeutic options are a re-endovascular treatment or surgery in these circumstances. Although endovascular intervention is less invasive, recanalization of the occluded stent will likely not be successful due to the neointimal hyperplasia and fibrosis.[8] In an antegrade approach, the guidewire is passed through the occluded SFA stent.[11,12] Then, predilatation with a balloon and stenting is performed in the neo-lumen.[11,12] But passage through the occluded stent is difficult due to neointimal proliferation and rigid fibrotic tissue. The arterial lumen structure is also vulnerable and damaged. Therefore, the risk of dissection or vascular perforation during the procedure is very high in these patients. An antegrade approach may be seen as a safe strategy for revascularization, but its effectiveness is very limited. The procedural success of revascularization of an occluded SFA stent has been reported to be only 13% to 26% in antegrade technique cases.[13] A retrograde transpopliteal approach may be considered when an antegrade approach fails. Although there are risks of vascular complications with the transpopliteal approach, it can be extremity-saving in cases when an anterograde approach fails. Patients who cannot be revascularized via an antegrade or retrograde transpopliteal approach are at increased risk for extremity amputation. In our case, we failed to recanalize the occluded SFA stent using an antegrade approach and a SFA perforation developed at the level of the occluded stent. Since there was no distal flow in the popliteal artery and infrapopliteal tract, we could not consider a retrograde transpopliteal or infrapopliteal approach. Therefore, a direct stent puncture technique was used on the occluded SFA stent, which was successfully revascularized without vascular complications in the in-stent puncture site. The direct stent puncture technique has some limitations. There is the potential for vascular bleeding, thrombosis, hematoma at the in-stent puncture site, collateral vessel injury, or stent deformation. Nonetheless, the direct stent puncture technique can be a good alternative for recanalization of a long in-stent occlusion in the SFA in patients who do not have distal flow or antegrade intervention fails.

Conclusion

In-stent occlusion is one of the important issues related to endovascular SFA stenting. In these cases, percutaneous re-intervention and bypass surgery are useful treatment options. A percutaneous antegrade approach is a safe and feasible method for revascularization. If that fails, a retrograde transpopliteal approach is an alternative option. A direct stent puncture technique may also be used as a last option before surgery when an antegrade approach fails and the distal flow necessary for a retrograde transpopliteal approach is insufficient.

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Anahtar sözcükler: Oklüzyon; rekanalizasyon; stent.