

Tips and Tricks in Below-Knee Peripheral Artery Disease Interventions

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Abstract

Critical leg ischemia, which threatens lower extremity and life, is an important form of lower extremity peripheral artery disease. Below-knee peripheral artery disease is an important part of critical leg ischemia. The most important treatment of below-knee peripheral artery disease is endovascular treatment. Knowing the endovascular treatment techniques is very important in increasing the success of the procedure. For this reason, we have presented this mini review called tips and tricks in below-knee peripheral artery disease interventions.

Keywords: critical leg ischemia; below-knee peripheral artery disease; endovascular therapy

Introduction

Lower extremity artery disease is a disease of the iliac artery and its distal arteries [1]. This arterial disease may be asymptomatic or present with signs of intermittent claudication, acute or chronic leg ischemia [2]. Lower extremity artery disease is an important part of lower-knee arterial disease. Below-knee peripheral artery disease is a serious cause that increases amputation rates [3]. Endovascular therapy is an important treatment component of this arterial disease group [4]. In a multi-center observational study in below-knee procedures, the endovascular treatment success rate was found to be 83 % [5]. Good knowledge of endovascular treatment techniques can further increase the success of this procedure. That's why we presented this article.

Tips and Tricks

Conventional balloon angioplasty is the preferred method in non-calcified focal stenosis in below-knee intervention. Balloon dilatation lasting between 30 seconds and 3 minutes is recommended in below-knee interventions [6]. Stenting is recommended in case of flow-limiting dissection or a long complex lesion. Balloon expandable stents are associated with late stent deformation, mechanical compression, restenosis, and late clinical failure, especially in the distal superficial femoral artery. Self-expandable stents, on the other hand, have significant patency rates of 1-3 years. Nitinol coated stents such as SUPERA can be placed in joint areas. However, its use is limited due to late mechanical deformation and restenosis. SUPERA stent is placed over a 0.014-0.018 inch guidewire. Adjusting the distal of the SUPERA stent is difficult. Because if we withdraw the catheter without holding it still, it may settle down from the targeted place since the mesh intervals will be too much. If we keep the catheter fixed, the stent can be placed above the targeted place since the mesh intervals will be frequent. In the below-knee

intervention, nitrate should be applied before retrograde puncture as well as nitrate after predilatation. The results of the medicated balloon are not good in the below-knee intervention. An increase in amputation rates has been reported after drug-eluted balloons. That's why a drug-free balloon is used. In the transpedal procedure, if there is not enough distance or if there is a lesion, corsair and guidewire can be sent directly without sheath placement. In the transpedal entrance, the dorsalis pedis is punctured, especially perpendicular to the anteroposterior direction, while the tibialis posterior is entered at an angle of 30 degrees. In transpedal interventions, opaque is diluted in half to reduce the pain. Road map can be used at the entrances. Wires such as fielder fc, fielder XT, Whisper, gladius can be used in the star technique (for subintimal advancement by looping the tip of the catheter), especially in the transpedal entrances in the lower-knee intervention. Halberd is a 0.018-inch hydrophilic wire that can be used for intraluminal advancement. 0.014; 0.018; 0.035 inch wires are used, respectively, in below-knee intervention. However, if 0.035 wire is to be sent, care is taken to ensure that the tip is straight. V15 can be used as 0.035 inch wire. Since the hard part of the wire is distal in the transpedal entrance, the wire taken into the contralateral guiding catheter is taken out and passed through the balloon, the soft part of which is advanced antegradely to the distal of the lesion. Thus, the soft part of the wire is placed distally in the transpedal entrances. If calcification is evident in these lesions, dilatation is performed using sprinter 1.5-3.5x15-20-30 mm balloons. Sprinter noncompliant balloon can be used in highly calcified fibrotic lesions. Balloon dilatation may be required for transpedal entries to control bleeding at the insertion site. K catheter, bern catheter or sim catheter can be used in below-knee intervention by cutting the tip. With these catheters, the wire can be guided to the anterior tibial artery that is angled. Sometimes the distal can be reached by using a 1.5-150 cm balloon as a microcatheter. In the below-knee intervention, a new technique is opened in the balloon and images can be obtained while

balloon dilatation is performed with iatrogenic perforated balloon technique [7]. Or we can apply thrombolytics for thrombosed lesions by drilling a hole in the balloon. Alteplase can be applied to thrombosed lesions at a rate of 10 mg push, 2 mg / hour. In addition, in thrombosed lesions, we can push the thrombus distally by inflating the balloon and sweeping technique. Popliteal and pedal interventions are chosen especially in patients with foot lesions due to diabetes where antegrade intervention is not possible. Popliteal vein can often be entered in popliteal artery puncture, which can be managed using Doppler ultrasound. In the transcollateral approach, one artery is passed from one artery to another via a collateral. This approach is chosen when the proximal occlusion stump is unclear, a dissection flap or perforation in the proximal part of the target vessel prevents the passage of the wire, or when distal disease makes retrograde puncture impossible [6].

Popliteal puncture is indicated for difficult calcified superficial femoral artery and common femoral artery lesions. It requires flank puncture and is difficult in obese patients. Best results are obtained with ultrasound guidance and micropuncture. Attention should be paid to popliteal hematoma and nerve compression [8]. Perforation, acute thrombosis, arterial spasm, distal embolization, and compartment syndrome can be seen as complications in these procedures. Grip balloon is a balloon with 4 very small knobs on it and is used in focal in-stent restenosis. Chocolate balloon is a balloon that penetrates into difficult calcified lesions with a horizontal segmented structure whose corners swell more than the center. Digital subtraction angiography is a very useful diagnostic method, especially in demonstrating the distal bed containing the plantar arch in the below-knee procedure.

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