Diagnosis and treatment options for the infrapopliteal peripheric arterial occlusive diseases

İnfrapopliteal tıkayıcı periferik arter hastalıklarında tanı ve tedavi seçenekleri

Advances in angiographic technology, surgical techniques and anesthesia/critical care management have all contributed to the improved results with infrapopliteal reconstruction for limb-threatening ischemia (1). Recent studies show that when infrapopliteal arterial bypasses are extended as far distally as to the ankle and foot, the overall functional results have been superior to those attained with lumbar sympathectomies or major amputations (2, 3). Moreover, if infrapopliteal bypasses are performed with short vein grafts, they can generate acceptable limb salvage results despite the presence of poor angiographic runoff, high outflow resistance, or both (1). There are few articles published in the literature about limb salvage with short vein grafts and poor angiographic findings.

The goal in the study by Yasa et al. (4), entitled "Bypass grafting for infrapopliteal occlusive disease with poor distal flow on angiography" is to compare the effects of surgical and medical treatments in patients with critical limb ischemia and poor distal flow on angiography. For this purpose, ankle-brachial index (ABI), claudication and walking distances, graft patency and survival data were collected and analyzed. This comparison provides valuable information for readers about factors affecting the outcomes of patients with infrapopliteal occlusive disease.

The characteristics of vascular lesions in peripheral arterial disease and indications for their treatment are commonly categorized as A-D according to TASC (Transatlantic Inter-Society Consensus) classification, which is based on degree of complexity, A being the least complex and D-the most complex (5). Depending on the category of the lesion, the necessary treatment approach is considered. For instance, a lesion classified as type D currently can be treated by endovascular approach or open surgical approach. If the patient cannot undergo these approaches, only medical therapy can be considered. The TASC categories unfortunately fail to describe either the severity of the disease or correct treatment. Patients with diabetes mellitus have diffuse involvement of peripheral arteries and thus it is difficult to classify these patients into one category. In the study Yasa et al. (4), patients with Fontaine classification stage 3 and 4 were included into the study. Stage 3 is nocturnal and/or resting pain, whereas, stage 4 is necrosis (death of tissue) and/or gangrene of the limb. In this study (4) all patients had critical limb ischemia (CLI) according to the TASC criteria (5); with non healing (>4 weeks of local dressing and conservative treatment) ulcer and/or gangrene of the foot.

Autogenous vein is believed to be critical to the success of infrapopliteal bypasses and was used in more than 90% of procedures in this series. Although there are isolated reports of improved results with techniques such as a Taylor vein patch on distal tibial polytetrafluoroethylene anastomoses (2), prosthetic material remains a suboptimal conduit for crural or pedal arteries. Arm vein, although inferior to saphenous vein, remains a viable alternative to prosthetic graft material and was used in a study by Misare et al. (3). Multiple reports over the last decade have documented the clear superiority of autogenous vein grafts over prosthetic reconstructions at the infrapopliteal level. Patency rates for reversed vein bypass grafts have been quite variable, ranging from 37% to 77% at 5 years (6, 7). More uniformly good results have been achieved by use of the in situ technique with 3-year patency of 80% or better, being reported by several groups (6, 7).

With the growing acceptance of the feasibility of very distal bypass to tibial and inframalleolar vessels, more vascular surgeons are encountering patients with severe circumferential calcification of otherwise patent outflow vessels when attempting distal anastomoses. Shorter popliteal-tibial or popliteal-pedal bypass procedures are often possible in patients with severe vascular calcification. Diabetic patients tend to have calcific arterial occlusive disease, which is often limited to the crural arteries. In patients with severe distal arterial calcification, the inflow vessel was most commonly the popliteal artery (3). Adequate preoperative assessment of both inflow and inframalleolar level outflow arteries with Doppler studies and angiography is critical in identifying patients with

Address for Correspondence/Yazışma Adresi: Dr. Ayşe Baysal, Dicle Cad. 45 ADA Mimoza 1-1A D:15 34758, Ataşehir, İstanbul, Türkiye
Phone: :+90 216 456 24 36 Fax: +90 216 459 63 21 E-mail: ayse_baysal11@yahoo.com

reconstructible occlusive disease, regardless of the presence of severe calcification. The presence of vascular calcification on preoperative radiological studies should not preclude attempts at arterial reconstruction.

Duplex scanning (DS) is an accurate technique for assessment of the aortoiliac and femoropopliteal arteries. Several studies have confirmed its reliability to guide percutaneous transluminal angioplasty (PTA) of the iliac and femoral arteries or an aortofemoral bypass operation in patients with claudication. Although in some studies the diagnostic accuracy of DS for assessment of the infrapopliteal arteries was low compared with arteriography (8), others found DS to be accurate or even to be capable of detecting more patent crural arteries (9). Changes in a cross-sectional area of the vascular lumen can be determined by means of peak systolic velocity (PSV) at the site of stenosis, the ratio of PSV at the site of stenosis and its immediate normal vicinity, end-diastolic velocity, and more subjective criteria such as number of phases in the Doppler waveform and degree of spectral broadening. The accuracy of detection of a stenosis greater than or equal to 50% or an occlusion in the infragenicular arteries was lower with a sensitivity and specificity of 83% (59-96%) and 84% (69-93%), respectively (9). Yasa et al. (4) used Duplex scanning of posterior tibial, dorsalis pedis, anterior tibial and lateral plantar arteries and shared their experiences showing that Duplex scan was successful in detecting stenosis that is greater than 50% and/or occluded. If there is a stenosis greater than 50% then the Doppler waveform is transferred from triphasic to monophasic; this is usually observed when the PSV is greater than 200 cm/sec. If there is an occlusion, then a signal cannot be obtained and a poststenotic turbulence or trill cannot be heard. These findings are mostly important in patients with diabetes mellitus with multivessel disease. For decision on the surgical treatment modalities, Duplex scan is still not considered to be the only diagnostic test and an angiography is required to proceed to surgery. Yasa et al. (4) used Duplex scan as well as angiography in both groups. In the literature, there is one study by Elsman et al. (10) showing that treatment decision was based on non-invasive tests and diagnostic angiography requirement was reduced by about 50%.

Yasa et al. (4) used autologous greater saphenous vein graft material with acceptable success in their study. Short vein bypasses have less potential to occlude and have a tendency to remain open for longer time periods when compared to the prosthetic grafts. In addition, the risk of wound infection is found to be less in autologous vein grafts. Most of the patients who have peripheral arterial occlusive disease are either old and/or has been diagnosed of having diabetes mellitus. The performance of the autologous grafts have been followed-up for 36 months in the study by Yasa et al. (4) and this is a fairly long period of time to show positive effects of this procedure on patients. The patency rates remained mostly stable for long period of time and have increased the chance of having better life quality in that specific period of time. The amputation level tends to be lower in the surgical group than in the medical group, which also points out to the better functional capabilities of the patients even if the surgery was unsuccessful.

This study is a demonstrative work of bypass grafting for infrapopliteal occlusive disease with poor distal flow on angiography. Larger groups of patients will provide better statistical results. The follow-up period of 36 months is a fairly long period of time, which provides valuable data on the patency of autologous vein grafts that are placed below ankle level with surgical procedure providing multiple short vein grafts to the extremity. Limb salvage is a critical topic in patients with peripheral arterial disease that requires continuance of scientific exploration for achievement in both medical and surgical treatments.

Ayşe Baysal
Department of Cardiovascular Surgery, Anesthesiology and Reanimation, Kartal Koşuyolu High Speciality Training and Research Hospital, Kartal, İstanbul, Turkey

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