The Loop Technique for the Plantar Arch Reconstruction

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Introduction

Peripheral arterial disease (PAD) in diabetes is often a severe condition frequently involving leg and foot arteries.

In detail, in those patients typical below-knee (BK) arterial lesions are mainly represented by occlusions longer than10 cm that frequently interest the foot arteries including the plantar arch [1].

In addition, in case of PAD in diabetes, it is relatively common the development of various grades of ischemic foot ulcerations and necrosis, mainly due to the lack of support from the collateral circulation in response to the arterial obstructions [2–8] (Fig. 59.1).

During the last 10 years, leg and foot arteries recanalization technique has become of crucial importance, having shown their effectiveness in large series [9, 10].

In addition, extreme vascular interventions may represent today an attractive alternative to bypass surgery in most cases [11].

As we know, arterial circulation in the hand and foot is typically represented by an anastomotic arch [12], named plantar arch in the latter (Fig. 59.2) and formed by the dorsalis pedis artery, continuation of the anterior tibial artery, which is anastomosed by the deep plantar artery with the lateral plantar artery, main branch of the posterior tibial artery.

In normal conditions, typically this arch ensures the preservation of foot circulation even in case of occlusion of one of the two tibial feeding arteries.

Usually the peroneal artery does not contribute to the anastomotic circulation, except for its small collateral branches named anterior and posterior perforating branches, connected with the anterior and posterior tibial artery, respectively.

Due to the well-known inability of diabetics in creating efficient collaterals, plantar arch arteries become in fact functional end arteries so favoring the chance of necrosis formation even in case of a single tibial artery occlusion or plantar arch interruption.

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Endovascular Management of Buerger Disease

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Introduction

Thromboangiitis obliterans (TAO), widely known as Buerger's disease, is a non-atherosclerotic segmental disease, characterized by occlusive, inflammatory, and thrombotic changes, and highly cellular with polymorph nuclear leukocytes, microabscesses, and multinucleated giant cells, affecting most commonly small- and medium-sized arteries and superficial veins of legs and arms [1–7].

The specific pathophysiology underlying Buerger's disease is still unknown; however, it has been well accepted that tobacco use, in any of its forms, plays a central role in the pathogenesis and progression of the condition [8].

Even though the disease has a worldwide distribution, the highest incidence occurs in the Middle and Far East than in North America and Western Europe; part of this variation could be explained due to variability in diagnostic criteria and differences in tobacco use worldwide [1].

Although tobacco use has decreased in many developed countries, it has increased in most developing countries.

High-risk amputation rates are still reported even with conservative therapies as smoke cessation, wound care, and pain management, describing a total amputation rate of 33 % in most recent series [3].

Thromboangiitis obliterans (TAO), widely known as Buerger's disease, typically occurs in the young and smokers, with onset of symptoms before age of 40–45 years, and men are most commonly affected.

As the disease progresses, typically calf claudication and eventually ischemic pain at rest and ischemic ulcerations on the toes, feet, or fingers may develop.

Superinfection often occurs and the lesions progress towards necrosis and distal gangrene.

The prognosis for patients with Buerger's disease with respect to limb loss is significantly worse than for patients with either atherosclerosis or the various forms of necrotizing immune arteritis [1, 2].

Nowadays, the only proven strategy to prevent progression of the disease and avoid amputation in some cases is the

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Use of Collateral Branches in the Treatment of Tibial Arteries Chronic Total Occlusions (CTOs)

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Introduction

Peripheral intervention has emerged as a valid alternative to bypass surgery for treatment of critical limb ischemia (CLI) [1, 2].

This is particularly true in CLI patients with diabetes mellitus [3, 4] as well as in those on chronic dialysis, in whom percutaneous transluminal angioplasty (PTA) has shown to be safe and effective in avoiding major amputation [5].

Nevertheless, it has to be considered that endovascular intervention may be technically challenging in diabetic subjects with CLI, because they mostly have infrapopliteal disease, usually characterized by long chronic occlusions of anterior and posterior tibial arteries [6].

Using the new morphologic categorization [6] based on 417 consecutive CLI diabetic patients with ischemic foot ulcers undergoing lower-limb subtraction angiography, out of the 2,893 lesions (55 % occlusions), 1 % was in the iliac arteries, and 74 % were in below-the-knee (BTK) arteries.

Sixty-six percent of all BTK lesions were occlusions, and 50 % were occlusions longer than 10 cm. Occlusions of all BTK arteries were present in 28 % of the patients.

Due to the complexity of the tibial arteries involvement in diabetes, a variable percentage of tibial arteries CTOs cannot be recanalized using endovascular techniques.

The importance of providing direct straight-line flow to the foot in diabetic patients with CLI has already been emphasized by vascular surgeons who observed better outcomes with distal bypass compared to femoral-popliteal graft or profundoplasty [7].

However, improvement of collateral circulation by surgical or endovascular procedures has also been reported.

In case of non-treatable occlusion of the superficial femoral artery (SFA), an alternative way to increase blood supply to the foot is to improve collateral circulation by the treatment of ostial stenosis of the profunda femoris.

However, the clinical efficacy of this procedure in diabetic patients with CLI is dubious [8, 9], probably due to the

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