

Combined Retrograde–Antegrade Arterial Recanalization Through Collateral Vessels: Redefinition of the Technique for Below-the-Knee Arteries

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Abstract The effectiveness of below-the-knee PTA to obtain successful revascularization in patients with critical limb ischemia (CLI) has been well established, and many centers have adopted endovascular intervention as the first-line treatment in patients with chronic lower-extremity disease. The well-known complex and multilevel arterial disease in patients with CLI have lead to interventionists to continuously implement different technologies and techniques. The aim of the present study was to standardize and redefine a technique characterized for combined retrograde–antegrade recanalization of a native leg artery through a collateral arterial branch by using a single access. This concept has been well described in coronary arteries and recently in pelvic and tibial arteries.

Keywords Arterial occlusive disease · Endovascular techniques · Alternative techniques · Below the knee · Endovascular revascularization · Critical limb ischemia

Introduction

During the last decade, endovascular intervention for infrainguinal vascular disease has evolved considerably. New technology has rapidly emerged and has been disseminated to the vascular community, allowing the percutaneous treatment of increasingly complex lesions [1–6]. In a minority of cases of extreme vascular intervention, it is not possible to perform regular antegrade recanalization of

occluded tibial arteries, which makes even the most expert interventionist resort to unusual techniques [7–9] to restore direct blood flow to the foot [10].

This report describes our initial experience using a new technique for below-the-knee arteries applying the same strategy that has been previously described in iliac arteries [11]. This technique essentially combined retrograde and antegrade arterial recanalization using a single entry site. A similar technique was first described in the coronary tree [12, 13].

Case No. 1

A 75-year-old man, with insulin-dependent type 2 diabetes and a current smoking habit, was admitted to our institution with right critical limb ischemia (CLI). He presented with extensive ulceration of the lower leg, heel, and first toe; with persistent rest pain; and a Rutherford classification of grade 5 [14, 15]. In a previous ultrasound examination, the right superficial femoral artery (SFA) was found to be occluded, and distally only a monophasic sign at the anterior tibial vessel was noted.

Antegrade femoral angiography documented a long SFA occlusion reconstituted at the first popliteal segment and subsequent extensive occlusion of the distal anterior tibial (AT), tibioperoneal trunk (TP), peroneal and posterior tibial (PT) arteries. At the foot level, the dorsalis pedis (DP) artery was poorly perfused by collaterals from the peroneal artery and through the anterior perforating branch (Fig. 1A, B). The angiographic findings, which represented class 6 of our morphologic scoring [1], correspond to Transatlantic Inter-Society Consensus (TASC) class D [16].

To provide direct flow to the foot, regular antegrade recanalization of the SFA was achieved: A long 79 150-mm

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