Subintimal Recanalization Plus Stenting or Bypass for Management of Claudicants with Femoro-popliteal Occlusions

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WHAT THIS PAPER ADDS
Long-term results of subintimal angioplasty plus stent in a homogenous series of claudicants with femoropopliteal occlusions.

Objective: To assess a practice of claudicant revascularization with either subintimal angioplasty (SIA) plus stenting or femoropopliteal bypass.
Methods: All claudicants related to femoropopliteal occlusions treated either with above-the-knee femoropopliteal (AKFP) bypass (group 1) or SIA and stent (group 2) between 2004 and 2011 were reviewed. The two groups were analyzed with regard to patency and freedom from re-intervention.
Results: One hundred and fifty limbs were consecutively treated with AKFP bypass ($n = 82$), SIA plus stenting ($n = 58$), or SIA ($n = 10$). Bypasses were performed with synthetic grafts in 49 limbs (59.7%). Covered stents were used in 34 limbs (63%) and self-expandable stents in the remainder. Mean follow-up was 26 and 36 months, respectively, in group 1 and 2. At 24 months, primary, primary-assisted, and secondary patency for bypass versus SIA + stent groups was, respectively, 66.6 versus 70.1%, 76.5 versus 90.1%, and 88.2 versus 90.1%. Freedom from re-intervention rates at 12 and 36 months were, respectively, 78.8 and 68.4% for group 2 and 86.4% and 65.2% for group 1.
Conclusion: SIA plus stenting is an effective and useful option for the management of claudicants with femoropopliteal occlusions, and can be considered as complementary to surgical bypass.

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INTRODUCTION

Over two decades, since the technique of subintimal angioplasty (SIA) was first described by Bolia et al.[1] for the treatment of long occlusive lesions, the indications remain variable and controversial. Proponents of SIA use it as a primary therapy for critical limb ischemia, as well as for claudicants, whereas those who reject it use it solely for candidates unsuitable for surgical bypass.[2–5]

Criticism of this technique has mainly concerned the relatively low patency rates compared with surgical bypass. These were evaluated to vary between 56 and 70% at 1 year[6–8] independently of the degree of ischemia. In patients with critical limb ischemia, the relatively high re-occlusion rates did not affect clinical outcomes as the limb salvage rates reported in most series remained as high as 80–90%.[7] However, in claudicants, the clinical success criterion is the relief of symptoms, which is directly related to the patency. Thus, improvement of patency may allow the widespread acceptance of this technique for claudicants.

The loss of primary patency is probably multifactorial. According to reports in the literature, a high rate of occlusion occurs early during the first 6 months.[9] This suggests that these occlusions can be related to elastic recoil with residual stenosis and/or flow-limiting spiral dissection. In our practice femoropopliteal occlusions were managed either with surgical bypass or subintimal recanalization, depending principally on the lesion location. With a view to improving patency, we often tended to combine SIA technique with stenting.

Our assumption is that the adjunction of stent to a subintimal recanalization allows improvement of results and optimization of the Bolia technique without competing with the surgical bypass, which is considered as the standard treatment.

To assess the place of SIA plus stenting in the treatment of claudicants, we present an audit of our practice through an analysis of patency and re-intervention rates in both an endovascular group and a surgical group treated during the same period.

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MATERIALS AND METHODS

From February 2004 to February 2011, we retrospectively reviewed all patients with disabling claudication admitted to and treated in our department. Disabling claudication was defined as a measured walking distance of <100 m with impairment of functional status and quality of life, and an ankle–brachial index (ABI) < 0.5. All patients were evaluated with computed tomography or magnetic resonance angiography prior to the revascularization procedure. Arterial occlusion only included femoropopliteal arteries. Patients were treated either with above-the-knee femoropopliteal bypass, SIA, or SIA plus stenting. Data including patient demographics, associated co-morbidities, anatomical features of lesions, Society of Vascular Surgery runoff score,[10] operative reports, and outcomes were reviewed.

Indications

Depending on the extent of the occlusion into the femoropopliteal segment and the re-entry site, we arbitrarily divided the lesion level into middle or distal superficial femoral artery (SFA), proximal SFA occlusion, total SFA, or femoropopliteal occlusion.

The choice of revascularization technique depended on the surgeon's preference and the extent of the lesions. Middle or distal SFA occlusions are considered favorable anatomy and, consequently, only the endovascular procedure was attempted. In contrast, for the technically more complex proximal, total SFA, or femoropopliteal occlusions, the decision to undertake one or the other technique was left to the surgeon's discretion.

After SIA procedures, the indication for stenting depended on the location and lesion length, and the angiogram results after angioplasty. Stents were indicated for long occlusions (≥10 cm) and/or blood flow limitation related to intimal flap or residual atherosclerotic stenosis >30%. Stents were not used for recanalization with a re-entry zone below the knee joint or for short occlusions with no blood flow limitation on angiogram.

Techniques

Femoropopliteal bypass was performed with the usual technique. The conduits used were either synthetic or saphenous vein grafts. Graft diameters varied from 6 to 8 mm depending on the diameter of popliteal artery evaluated preoperatively. Our policy is generally to use prosthesis in elderly patients or in cases of co-morbidities, in those with unsuitable vein (diameter < 5 mm), and those with a good run off vessel; however, the final decision was left to the surgeon's discretion. Post-operatively, patients were placed on a single antiplatelet therapy.

All endovascular procedures were performed in the operating theater under general anesthesia, or local anesthesia with conscious sedation. The ipsilateral common femoral artery was the preferred angiographic access. A controlateral femoral artery puncture was used in cases of flush SFA occlusion, previous groin surgery, or obese patients. More recently, flush occlusion treatment with above-the-knee re-entry was attempted via an up and over approach through popliteal ponction.

All patients with significant stenosis of the ipsilateral iliac or common femoral artery were treated during the same procedure in order to improve the inflow.

For those with significant stenosis of the common femoral artery or the profunda femoris artery, a surgical approach with a femoral bifurcation endarterectomy or femoro-femoral bypass was performed first, after which the patch graft used for the closure of the arteriotomy was punctured and the endovascular procedure was completed.

After artery puncture, an angiography was performed via a 5F sheath to identify the arterial occlusion, plan for the re-entry zone, and define the run-off vessels. A 5 F straight angiography catheter (Glidecath, Terumo Medical Corporation, Somerset, NJ, USA) was generally used to enter the subintimal space in combination with the guidewire tip. The occlusion was then crossed with a looped guidewire followed by a straight catheter. The re-entry into the true lumen was obtained either by means of catheter guidewire manipulations or by pushing the looped guidewire toward the patent vessel at the end of the occlusion site. Re-entry devices were not used in these patients because they were not available in our department during the study period. The subintimal space was then dilated.

Unlike the Bolia technique,[1] we believe that adjunction of stent along the entire length of the recanalized artery and not only at the entry or re-entry site can improve patency rates. Consequently, we adopted a liberal approach to stenting, except when the re-entry into the true lumen is performed at the level of the knee joint or for short occlusion with no blood flow limitation on angiogram.

Either self-expandable stents or covered stents were used in these patients. At the beginning of our experience, covered stents were the sole stents used. Currently, self-expandable stents are preferred—in particular, for long occlusion and/or when there are large collaterals in the treated segment which risk being covered. Combined procedures included all endovascular or surgical procedures used during the femoropopliteal recanalization in order to improve inflow.

During the procedure, all patients received 50 IU per kg of heparin intravenously, and for those who were not impregnated with antiplatelet agents, 250 mg aspirin was systematically added intravenously. After a successful procedure, patients received aspirin and clopidogrel for 6 months followed indefinitely by either aspirin or clopidogrel. Patients receiving Warfarin therapy were continued on the drug associated with aspirin.

Follow-up

Systematic follow-up included a clinical examination and duplex ultrasound scanning at 1, 3, 6, and 12 months, and thereafter yearly for the endovascular group, and at 1, 6, and 12 months and thereafter yearly for the surgical group. Patency was assessed by means of palpable pedal pulse,