Eur J Vasc Endovasc Surg **30**, 610–613 (2005)
doi:10.1016/j.ejvs.2005.06.014, available online at http://www.sciencedirect.com on SCIENCE DIRECT®

Endoluminal Angioplasty of the Popliteal Artery. Review of 54 Consecutive Patients

A. Abdul Raouf,* Y. Rouleau, A. Clement, P. Le Roux, P. Genay and J.-B. Ricco

Service of Vascular Surgery, CHD Les Ouclairies, 85925 La Roche sur Yon, France

Aim. *To determine the results of endoluminal angioplasty for occlusive or stenotic lesions of the popliteal artery.*
Methods. *Retrospective study of symptomatic patients having popliteal occlusive lesions treated by endoluminal balloon angioplasty. All patients underwent systematic preoperative and postoperative color duplex scan and preoperative angiography. The principal endpoints were primary and primary assisted patency.*
Results. *Fifty-four percutaneous endoluminal angioplasties of the popliteal artery, including six procedures with stents, were performed in 50 patients. In all cases, the superficial femoral artery was patent and without significant stenosis. Primary patency for the entire cohort was 57.4±6.7% at 1 and 2 years. Primary assisted patency was 86.3±4.8% at 1 year, and 79.1±5.9% at 2 years.*
The results of angioplasty appeared to be better in patients with intermittent claudication when compared to patients with critical limb ischaemia, (p=0.0006). Angioplasty of single occlusive lesions had a better prognosis than that of multiple occlusive lesions (p=0.01). Results of angioplasty were better at the below-knee and median popliteal artery than at the femoro-popliteal junction or in the above-knee popliteal artery (p=0.03). Tibial run-off and isolated popliteal stenosis versus *isolated popliteal thrombosis did not seem to affect primary patency rate.*
Conclusion. *Results of angioplasty of the popliteal artery are acceptable for claudicants, especially those with TASC-A lesions and those with lesions in the distal two thirds of the popliteal artery.*

Keywords: Balloon dilatation; Popliteal artery; Stenosis; Primary patency; Primary assisted patency.

Introduction

The results of endoluminal angioplasty of the popliteal artery have rarely been studied specifically. In most cases, authors have studied the results of angioplasty of the superficial femoral artery with that of the popliteal artery.[1–3] Only two studies focusing specifically on angioplasty of the popliteal artery can be found in the literature. The first, performed by Steinkamp[4] concerned 215 cases, and compared the results of endoluminal angioplasty with a balloon catheter with those of laser endoluminal angioplasty. The second study, performed by Strecker,[5] evaluated the efficacy of flexible tantalum stents in treating residual stenoses after angioplasty of the popliteal artery. In most studies, results have focused on angioplasty for the entire femoral and popliteal segment: In this setting, primary patency rate, varies from 22 to 81%, after 1-year follow-up. The aim of our study was to determine the 2-year results of endoluminal angioplasty for occlusive lesions limited to the popliteal artery.

*Corresponding author. A. Abdul Raouf, MD, Service of Vascular Surgery, CHD Les Ouclairies, 85925 La Roche sur Yon, France.
E-mail address: ayman.abdulraouf@wanadoo.fr

Methods

This was a retrospective study of 50 patients having 54 popliteal angioplasties between January 1997 and April 2002. All these patients were symptomatic with intermittent claudication (IC=26) or critical limb ischemia (CLI=28). All patients had an occlusion or a significant stenosis of the popliteal artery. Before treatment, all patients had a duplex ultrasonography, with colour imaging, and angiography of the lower limbs. Lesions were classified according to TASC criteria. Patients excluded from the study were those presenting with acute ischemia. In contrast, patients presenting with a simultaneous significant stenosis of the iliac or common femoral artery, were included in the study. Percutaneous transluminal angioplasty (PTA) was performed by a vascular surgeon in the operating room, using a conventional guidewire and angioplasty balloon catheter technique without

1078–5884/000610+04 $35.00/0

thrombolysis or aspiration. During the procedure, each patient was given 50 IU/kg of heparin intravenously and if tolerated 160 mg aspirin daily thereafter. Postoperative criteria of success was defined: By relief or substantial improvement of claudication with an increase in walking distance by at least 50%, resolution of rest pain and limb salvage in patients with tissue loss. Patency was determined by duplex scan, performed routinely at 1, 6, 12 months after surgery and every year thereafter. Special emphasis was given to the site of angioplasty to detect any occlusion or significant restenosis with cross sectional area reduced by 70% or more. Angiograms were performed whenever significant restenosis or occlusion was seen by duplex. Ankle-brachial index was not obtained routinely. Failure of angioplasty was defined by persistence or recurrence of a significant popliteal stenosis by duplex scan, with or without worsening of clinical symptoms. Analysis of primary patency and primary assisted patency, was undertaken considering the following parameters: Preoperative symptoms, TASC classification (A, B, C) in the femoro-popliteal segment, and existence of single or multiple lesions, length of the lesion, thrombotic or stenotic lesion, location of the lesion on the popliteal artery, above knee, below knee or retroarticular. Finally, tibial run-off (number of patent arteries in the leg) was analysed. The Kaplan–Meier method was used to calculate the cumulative patency rate for individual variables and subgroups. The survival curves were compared by the log rank (Mantel–Cox) test.

Results

The clinical characteristics of these patients are shown in Table 1. Fifty-four endoluminal angioplasties of the popliteal artery were performed in 50 patients having 65 occlusive lesions (Table 2). Forty-four patients had a single occlusive lesion and 10 patients had multiple occlusive lesions, with two popliteal stenoses in nine patients, and three popliteal stenoses in one patient. Forty patients underwent angioplasty and 14 patients underwent recanalisation (the median length of occlusion in this series was 2.5 cm (range 0.5–8 cm)). Ultra thin angioplasty balloons (Boston Scientific) were used in all cases, the diameter of the balloon was 4 mm in 27 cases (41%) and 5 mm in 29 cases (45%). We also used 3 mm balloons twice (3%) and 6 mm balloons seven times (11%). Three haematomas occurred at the puncture site with one false aneurysm. Per-operative mortality was nil. Following initial angioplasty, we observed nine residual stenoses, from 20 to 50%, that were left untreated with one significant restenosis (11%) at 1 year. Follow-up was for 2 years in all patients. Two major amputations were needed during the first year in patients with critical limb ischemia (CLI), and two failures (4%) were treated by femoropopliteal or tibial bypass. Five concomitant lesions of the iliac or common femoral artery were treated, i.e two iliac angioplasties, two common femoral endarterectomies, and one ilio-femoral bypass. Three of these patients remain asymptomatic, one patient had a popliteal restenosis and one patient died during follow-up. In addition, two infrapopliteal lesions were treated simultaneously: One patient remains asymptomatic and one patient had a recurrent popliteal stenosis at 1 year. The primary patency rate, for the entire cohort was $57.4 \pm 6.7\%$ at 2 years. Primary assisted patency rate was $86.3 \pm 4.8\%$ at 1 year, and $79.1 \pm 5.9\%$ at 2 years. Four patients (8%) were lost to follow-up (three patients by 1-year and one by 2 years). Eleven patients (22%) died during follow-up. Among the 13 patients with a restenosis, primary assisted patency after repeated angioplasty was 69%, (six patients underwent two angioplasties, one patient underwent three consecutive angioplasties and two patients a bypass). Six nitinol self-expanding stents were used, two to treat a restenosis and four to treat a popliteal dissection during the initial procedure. These stents were positioned at the level of the upper popliteal artery. No stents were positioned in middle popliteal artery or lower popliteal artery. Five stents remain patent during follow up and one stent had occluded by 1 year.

Primary patency at 2-year was higher in patients with intermittent claudication ($87.0 \pm 7.0\%$) than in patients with critical limb ischemia ($38.2 \pm 10.8\%$) $p = 0.0006$ (Fig. 1). TASC type A lesions appeared to have a better patency ($73.4 \pm 7.6\%$) than type B–C lesions ($40.4 \pm 13.4\%$) $p = 0.09$. Angioplasty of single occlusive

Table 1. Patients and popliteal lesions characteristics

Characteristics	Patients (%)
Male	34 (68)
Risk factors	
Diabetes	24 (48)
Hypertension	27 (54)
Dyslipidemia	11 (22)
Current smokers	13 (26)
Ischemic heart disease	15 (30)
History of vascular disease	7 (14)
ASA classification	
ASA 1	2 (4)
ASA 2	17 (34)
ASA 3	28 (56)
ASA 4	3 (6)
Age	73 years (48–93)
Length of popliteal lesion	12 mm (2–80 mm)