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Clinical Research

Femoral Bifurcation Endarterectomy with Transection-Eversion of the Superficial Femoral Artery: Technique and Results

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Background: We evaluated the results of femoral bifurcation endarterectomy using the eversion technique with transection of the superficial femoral artery (femoral bifurcation endarterectomy with eversion [FBEE]).

Methods: We included all patients who underwent a femoral revascularization using the eversion technique, with or without antegrade or retrograde revascularization, from January 2006 to December 2015. Data were retrospectively collected. Primary and primary assisted patency (PAP) of the femoral bifurcation were analyzed. Secondary outcomes were 30-day postoperative complications.

Results: A total of 129 patients (143 limbs) underwent consecutive FBEE (86.8% men, with a mean age of 69.7 years). Patients presented with claudication (93, 65%) and critical ischemia (46, 32.2%). Primary patency was 96.3%, 94.6%, and 93% at 1, 2, and 5 years, respectively. PAP was 99% at 3 time points. Reintervention was necessary in 8 patients during follow-up. The 30-day mortality was 0.7% (1 patient), and the access complication rate was 18.8% ($n = 27$), of which only 2.8% ($n = 4$) were major complications.

Conclusions: This retrospective study confirmed the efficiency and the reproducibility of this technique for the treatment of femoral bifurcation lesions. This technique allowed treating extensive atherosclerotic lesions of the deep femoral artery and may be associated with antegrade and retrograde revascularizations.

INTRODUCTION

Surgical endarterectomy has been the gold standard treatment of atherosclerotic lesions of the femoral bifurcation for many years.[1–8] Development of endovascular therapies brought this precept into question. Endovascular treatment has been associated with lower morbidity and mortality, quicker recovery, and shorter hospital stay. Patency rates of endovascular treatment have been lower while acceptable than those with open surgery but remain acceptable. Results of endovascular treatment of the femoral bifurcation seem more satisfying with stent implanted.[9–12] Many techniques of femoral revascularization have been described with the common objective of reducing the complication rate. We modified the technique of carotid endarterectomy of the carotid eversion technique described by Chevalier.[13] We routinely performed an endarterectomy of the femoral bifurcation associated with transection and eversion of the superficial femoral artery (SFA). The purpose of this study was to evaluate the safety and efficiency of femoral bifurcation endarterectomy with eversion (FBEE) and to

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compare it with other open techniques[1–3,8] and endovascular treatment.[10,12]

METHODS

Study Design

A retrospective single-center study was conducted in Grenoble University Hospital on the outcomes of femoral endarterectomy using the eversion technique. We collected data from the vascular surgery database of all patients who had undergone femoral revascularization whether it was associated with inflow or outflow revascularization or not, from January 2006 to December 2015. Patients with femoral revascularization using another technique than eversion technique were excluded. Data collected included medical history, physical examination, operative notes, postoperative complications, and clinical and ultrasound imaging on follow-up at 1 month and 12 months and annually thereafter. Primary outcomes were primary and primary assisted patencies of the femoral bifurcation. Secondary outcomes were 30-day postoperative complications.

Definitions

Clinical success of FBEE was defined by clinical improvement of the following ischemic symptoms: pain relief, walking distance improvement, and trophic disorder healing. In this study, patency referred to the status of the FBEE and did not refer to the patency of associated proximal or distal revascularizations. Restenosis was defined as asymptomatic stenosis of the femoral bifurcation of >70% on imaging or >50% associated with worsening symptoms. Primary patency (PP) was defined as the absence of restenosis of the treated femoral bifurcation, without any reintervention. Primary assisted patency (PAP) was considered as femoral bifurcation patency requiring reintervention to treat postoperative stenosis.[14] Postoperative complications were defined as any complication occurring within 30 days after the procedure. Complications were considered major complications in case of hospital stay extension or reintervention.

Diagnostic Workup

The femoral bifurcation lesions were diagnosed on duplex ultrasound and computed tomography scan or angio-magnetic resonance imaging in case of renal failure. The patient's clinical category at presentation was determined according to the Rutherford classification according to reporting standards of the Society for Vascular Surgery.[14] Patients received statin and platelet aggregation inhibitor treatment.

Operative Procedure

Surgery was always performed under general anesthesia. Antibiotic prophylactic therapy (cefazolin 2g) was systematic. Dissection of the femoral bifurcation was performed using a classic longitudinal access. Heparin (50 IU/kg) was administered intravenously before clamping. A longitudinal arteriotomy of the common femoral artery (CFA) was performed up to the first centimeter of the deep femoral artery (DFA). SFA transection was done at 1 to 10 cm under the bifurcation, depending on where the atheromatous plaque ended. The endarterectomy was begun at the CFA by the standard technique, using a spatula, and the plaque was removed. For the distal segment of the CFA, once at its bifurcation, the spatula was used to mobilize the plaque circumferentially at the origin of the SFA. The plaque was sectioned using classical scissors. After distal division of the plaque, the endarterectomy was carried out into the DFA as distally as necessary. If a residual flap of the DFA was detected, classic Kunlin sutures were used. The last step of the endarterectomy was the eversion of the SFA. After the endarterectomy, we flushed residual debris with a heparinized saline solution. We then performed an end-to-end continuous suture of the SFA and closed the CFA with continuous suture or using a patch of enlargement (Fig. 1). Use of patch and type of patch (prosthetic or autologous vein or artery) were performed at surgeon's discretion. This technique was compatible with endovascular procedure for inflow, or outflow improvement or femoral/popliteal surgery.

Outcomes

During postoperative hospitalization in the vascular surgery department, vascular evaluation and wound healing were repeated regularly. Patients were discharged when access healing was favorable and pain relieved. The patients were routinely evaluated clinically and with duplex ultrasound at 1 and 12 months and then annually. When patients were lost to follow-up, general physician and vascular medicine physician were contacted by phone to evaluate the symptoms and results of duplex ultrasound.

Statistical Analysis

Results were expressed as numbers and percentages for categorical parameters, and as the mean and standard deviation for continuous quantitative variables with normal distribution or median and percentiles if necessary. Patency and survival analyses were