Above-knee Prosthetic Femoropopliteal Bypass for Intermittent Claudication. Results of the Initial and Secondary Procedures

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Objectives: to report the results of primary and secondary prosthetic above-knee femoropopliteal bypass for intermittent claudication.

Design: a retrospective study in a University hospital.

Patients: one hundred and twelve operations performed in 103 patients (26 women) between January 1990 and June 1997.

Methods: a comparison of primary assisted patency was made between Dacron and PTFE, between men and women and between operations performed early and late in the study period. Patency of secondary procedures was also studied.

Results: there were no operative deaths. The 5-year survival rate was 81% and equal to that of a demographically matched population. The primary assisted graft patency was 58% after two years. Women had a significantly better graft patency than men (79% vs. 49%). The type of graft and the date of the operation did not influence the outcome. Forty of the 55 occluded grafts were subjected to a redo procedure with a 1-year patency of 29%.

Conclusions: the results after prosthetic above-knee femoropopliteal bypass procedures are disappointing, and a controversy persists as to whether this operation should be performed for intermittent claudication. The results of secondary procedures are even worse, and perhaps should only be considered in patients suffering critical ischaemia.

Key Words: Intermittent claudication; Prosthetic femoropopliteal bypass; Graft patency; Secondary redo procedures.

Introduction

The treatment of intermittent claudication is controversial. The criteria for conservative treatment, endovascular treatment or surgical treatment have not been established.1 Likewise, no consensus exists on the best choice of conduit for above-knee femoropopliteal bypass. Several authors have reported acceptable results with the use of a prosthetic graft.2–7 Others have advocated the use of autologous vein.8,9 If autologous vein is preferred, in situ vein and reversed vein appear to give similar results.10,11 Secondary procedures are technically more demanding and the outcome of these procedures is less favourable, as compared to primary operations.12,13

We routinely use prosthetic conduits for above-knee femoropopliteal bypass because they appear to function as well as vein grafts, they are readily available and easy to use. The aim of the study is to describe the results of primary and secondary above-knee prosthetic femoropopliteal bypass for intermittent claudication.

Patients and Methods

One hundred and twelve above-knee femoropopliteal bypass operations performed for intermittent claudication on 103 patients between January 1990 and June 1997 in a single vascular unit were studied. PTFE was used in the early years of the study period, whereas Dacron was used latterly. Postoperatively, patients were given aspirin 160 mg daily on a permanent basis. Heart disease warranting treatment or causing symptoms was considered significant.

Duplex scanning was performed at one, three, six and twelve months and yearly thereafter. Significant (more than 50% diameter reduction) graft-related stenotic lesions were treated, usually with endovascular techniques. Graft occlusion was diagnosed on the basis of duplex scanning findings or symptoms. Every reintervention initiated new surveillance protocol.

Occluded grafts were opened selectively based on the level of symptoms and the general condition of the patient. No consideration was paid to the age of the graft at the time of occlusion. Treatment comprised thrombolysis, surgical thrombectomy, or construction.
of a new bypass, depending on the individual circumstances. Patients in whom a stenotic lesion was revealed after thrombolysis or thrombectomy were treated with either percutaneous transluminal angioplasty (PTA) or surgical revision, as an additional procedure.

Operative mortality was defined as death within 30 days. Kaplan–Meier survival curves were based on the index operation for the patients operated on more than once. For comparison, the expected survival of a demographically matched population was calculated from data provided by the Norwegian Central Bureau of Statistics. The relative survival, defined as the ratio of the observed survival to that of the expected, was estimated.

The assisted primary graft patency (i.e. primary patency of grafts where interventions may have been done on non-occluded grafts during follow-up) was calculated with the product limit method for all the procedures. A comparison was made between the two types of conduit (PTFE and Dacron) and men and women, and operations performed early (1990–1993) and late (1994–1997) in the series.

The primary assisted patency of the first redo procedure was also studied. A comparison was made between patients with intermittent claudication and those with critical ischaemia as a result of graft occlusion. Critical ischaemia was defined as rest pain or gangrene.

The Student’s t-test was applied to continuous data, Cox’s regression analysis was used to compare the graft patency. The SPSS statistical software was used for statistical computations.

Results

The mean and median ages of all the patients were 68 years and 69 years, respectively (range 43–88 years). The 26 women (25%) were significantly older than the men at the time of the index operation (mean age 71 versus 67 years p<0.01). Of the 103 patients, 40 (39%) had significant cardiac disease, 17 (16.5%) had diabetes mellitus and 19 (18.5%) had a creatinine >125 μmol/l. PTFE was used in 66 operations and Dacron in 46. The mean and median follow-up were 48 months and 45 months, respectively (range: 1–100 months). The 5-year survival was 81%, which was similar to that of a demographically matched population (Fig. 2). No significant difference was noted between men and women in either observed or relative survival. No difference in survival could be demonstrated between patients experiencing graft occlusion and those with persistently open grafts.

The mean and median graft follow-ups were 28 months and 22 months, respectively (range: 1–95 months). The assisted primary graft patency at two years was 58% (Fig. 3). Graft patency was not influenced by the conduit or by whether the operation was performed early or late in the series. Men and women had a two-year graft patency of 49% and 79%, respectively (p<0.05) (Fig. 4).

Fifty-five grafts occluded during follow-up, six during the first 30 days. Fifteen grafts were managed conservatively and none of these patients required subsequent amputation. Forty occluded grafts (in 36 patients) were either opened or replaced (Table 1). Twenty-two of these surgically treated cases had intermittent claudication and eighteen had critical ischaemia as a result of the graft occlusion (Table 2).

The 40 limbs undergoing a secondary procedure were submitted to a total number of 176 surgical
Table 1. Redo procedures after occlusion of 40 prosthetic above-knee femoropopliteal bypasses.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrombectomy</td>
<td>24</td>
</tr>
<tr>
<td>Thrombectomy and patch</td>
<td>2</td>
</tr>
<tr>
<td>Thrombolysis</td>
<td>6</td>
</tr>
<tr>
<td>Thrombolysis and PTA</td>
<td>3</td>
</tr>
<tr>
<td>New bypass</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 2. Symptoms following occlusion of 40 prosthetic above-knee femoropopliteal bypasses.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermittent claudication</td>
<td>22</td>
</tr>
<tr>
<td>Critical ischaemia</td>
<td>18</td>
</tr>
</tbody>
</table>

Discussion

Controversy regarding the indications for femoropopliteal bypass in patients with intermittent claudication may never be resolved. The decision-making process is complex and must be tailored to the individual patient. Improvements in quality of life after successful surgery must be weighed against the limitations of the procedure. Local factors such as the availability of resources, and surgical expertise are also important. This disparity in patient selection may explain the divergence of the reported results.24

In the present series patient demography and comorbidity are similar to those reported by others.2,17 PTFE was used as conduit early in the study period and Dacron was latterly used. This change of preference was merely due to the handling characteristics of the two conduits.

The long-term survival of the patients in the present series was similar to those of a demographically matched population, whereas previous reports have indicated a reduced survival for patients operated on for intermittent claudication.2,18,19 However, our patients were relatively old at the time of surgery, and a more favourable relative survival has been documented among older patients operated on for lower limb ischaemia.20
Patients undergoing secondary procedures exhibited a long-term survival similar to those with persistently open grafts. This was surprising, as we have previously reported an inferior relative survival of patients subjected to multiple vascular operations. A two-year primary assisted patency rate of 58% is similar to previous European reports, although superior results usually are reported from the U.S. Several authors have previously documented similar patency rates for PTFE and Dacron prostheses. However, the significantly superior graft patency in women as compared to the men has not, to our knowledge, been reported in the literature. One explanation may be the older age of the women in the series, since atherosclerosis may be more aggressive, and the results of bypass surgery less favourable, in younger patients.

Fifty-five grafts occluded during follow-up. These patients represent the major problem, as no firm criteria exist for the management of such grafts. The options are conservative treatment, thrombectomy, thrombolysis or a new bypass. In our series fifteen patients were treated conservatively and none of these needed a subsequent amputation. Forty grafts were opened or substituted, but only 29% of these grafts were patent at one year. The poor outcome of secondary procedures is in patients with occluded prosthetic femoropopliteal bypass grafts has been reported by others. The results do not seem to be affected by the type of redo procedure.

The patenty of secondary procedures for intermittent claudication was no better than those for critical ischaemia. For many patients continual graft patency required multiple operations. Workload and resource issues suggest that such procedures should primarily be offered to patients with critical ischaemia. This suggests that a femoropopliteal bypass is associated with a less favourable prognosis in terms of limb loss than the natural history of intermittent claudication itself. The crucial question is whether the benefit to the patient of a patent graft is worth the price paid by those who experience graft occlusion, subsequent critical ischaemia, multiple operations and amputation. Hopefully, future studies will teach us how to select the patients best suited for an above-knee prosthetic femoropopliteal bypass, and thereby reduce the occlusion rate.

In conclusion, the mediocre prognosis of an above-knee prosthetic femoropopliteal bypass performed on patients with intermittent claudication should rather indicate a more restrictive attitude towards this treatment modality. The procedure does not seem to improve the overall prognosis of the limb. The decision to operate must be made on an individual basis, and universal recommendations are difficult to give. The rather poor results following redo procedures propose a conservative management of patients with intermittent claudication due to occlusion of a prosthetic femoropopliteal bypass.

References

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