

Is Infrainguinal Bypass Grafting Successful Following Failed Angioplasty?

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Objectives. Angioplasty is often used in the management of lower limb ischaemia and can reduce the need for infrainguinal bypass in some patients. There is an associated failure rate with this technique and bypass surgery is often used in this situation as a secondary limb salvage procedure. We aimed to evaluate the outcome of infrainguinal bypass grafting following failed attempt at angioplasty.

Methods. All cases of infrainguinal bypass at a single centre over a seven year period were identified and notes reviewed. Cases were divided into four groups according to their indication for surgery; acute ischaemia, chronic critical ischaemia, failed angioplasty and an 'other' group including aneurysmal disease and claudicants. The failed angioplasty group was compared with the other three groups. Survival analysis was performed using Kaplan Meier curves and groups compared in terms of long term patency and survival.

Results. Primary patency was 61.2% in the failed angioplasty group at 12 months compared with 60.6% in the other groups ($P = 1.11$). There was also no significant difference in primary patency at 60 months (50% vs 40.6%, $P = 0.26$). Survival at 12 months was also comparable between the groups (failed angioplasty group 74.2% compared with 77.3% in the other groups, $P = 0.662$) as was 60 months survival (33.3% and 35.4% respectively, $P = 0.166$).

Discussion. In this study, outcome of infrainguinal bypass following failed angioplasty was comparable to outcome of surgery performed for another indication. This paper supports the use of distal bypass surgery for limb salvage in cases where minimal access techniques have failed.

Keywords: Infrainguinal bypass; Outcome; Angioplasty.

Introduction

Infrainguinal bypass grafting (IIB) has traditionally been the standard treatment for lower limb ischaemia. Controversies still exist over choice of graft material^{1–3} and traditional outcome measures such as graft patency and mortality have been suggested to overestimate success.^{4,5} In an effort to improve patencies and reduce wound complications a number of minimal access approaches have been attempted however these have seen variable results and have not yet found a place in routine clinical practice.^{6,7}

Over the last 10 years, angioplasty has provided an alternative to bypass surgery in many cases. Evidence suggests that outcome following lower limb angioplasty may be comparable to surgery, producing patencies of up to 79% at six months and 64% at

five years post procedure.⁸ Technical success rates achieved at angioplasty are reported at around 85%.⁹ Angioplasty may be unsuccessful due to a number of reasons: (1) Failure to cross the occlusion; (2) distal embolisation; (3) perforation of vessel; (4) failure to re-enter the lumen (in the case of a subintimal approach); (5) early re-occlusion.

In cases where angioplasty has failed, decisions regarding further management may be difficult. It may be that angioplasty has failed because of poor 'run-off' vessels, and therefore attempt at bypass surgery would also be likely to fail. In addition to this, the patient population are often elderly with significant co-morbidity and may have a poor outcome from a lengthy bypass procedure.

Currently, no reports describe outcome of IIB following failed attempt at angioplasty. The aim of this study was to determine the outcome of infrainguinal bypass following failed angioplasty and compare this with grafts performed for other indications in order to aid decision making when faced with this clinical scenario.

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Methods

A retrospective review of the case notes of patients undergoing infrainguinal bypass at a single centre during a seven year period from January 1995 to December 2002 was performed. Notes were reviewed by a single investigator (RMS) and details recorded regarding patient demographics, co-morbidity, anaesthesia, graft type and post operative course. Patients were then divided into 4 groups according to their indication for surgery. Group 1 underwent surgery for an acutely ischaemic limb, group 2 for a chronic critically ischaemic limb (defined by rest pain or tissue loss) without prior attempt at angioplasty, group 3 had operations following a failed attempt at elective angioplasty for peripheral vascular disease and group 4 had another indication for bypass, commonly claudication or popliteal aneurysm.

Patients with lesions considered to be suitable for angioplasty underwent primary angioplasty in the first instance, and those patients in group 2 who went straight to surgery had lesions considered unsuitable for angioplasty. Angioplasty was considered to have failed if the procedure was technically unsuccessful or re-occluded before the first post-procedure clinic visit at 6 weeks. All patients were followed up after IIB with duplex ultrasound scans 6 monthly in a Graft Surveillance Clinic.

Patencies and survival data were collected from the notes. Patients were censored from further analysis at the time of death with a functioning graft. Primary patency was defined as uninterrupted patency, not requiring any additional procedures, and secondary patency described grafts which required intervention following thrombosis.

Statistical analysis was performed using the SPSS statistical package version 12.0. Survival analysis was performed using Kaplan Meier curves. A probability value of <0.05 was taken to be significant.

Results

There were 273 grafts performed over the study period in a total of 252 patients. Notes were available for 202 of the patients who underwent 208 grafts. Where notes were unavailable, patients were excluded from the analysis but clinic letters were reviewed to ensure there was no selection bias. Demographic data are shown in Table 1. Cardiovascular risk factors were similar in all groups except for diabetes which was more common in the failed angioplasty group (33.3% diabetic vs 10.1% diabetic in other groups combined).

Table 1. Demographic data

Group	Number of patients	Median Age (range)	% Male	IHD (%)	↑BP (%)	DM (%)
1	42	67 (30–87)	83%	10 (24)	12 (29)	3 (7)
2	60	75 (45–92)	63%	16 (27)	23 (38)	11 (18)
3	66	77.5 (33–92)	45%	18 (27)	38 (58)	22 (33)
4	40	62 (24–85)	85%	6 (15)	8 (20)	2 (5)

Where IHD = ischaemic heart disease (defined as previous myocardial infarct or angina), ↑BP = hypertension (defined as currently treated with antihypertensives) and DM = diabetes.

There were 42 grafts performed for acute ischaemia, 60 for critical ischaemia, 66 for failed angioplasty and 40 in the 'other' category. The small number of grafts performed for critical ischaemia over this time period (group 2) reflects the policy of our centre to perform primary angioplasty for all lesions considered suitable. Indications for angioplasty varied, but were often for critical ischaemia (defined by rest pain or tissue loss) associated with superficial femoral artery and 'run off' vessel occlusion (see Table 2). 23 (35%) patients underwent intraluminal angioplasty for stenoses, where 43 (65%) underwent subintimal angioplasty for occlusion. Seven of the 66 (11%) grafts in group 3 (the failed angioplasty group) were performed as an emergency due to distal embolisation during angioplasty. Other reasons for failure of angioplasty included failure to cross the stenosis in 22% of cases, perforation in 13% of cases, heavy calcification in 6% and early re-occlusion in 31%. In 17% of cases, angioplasty was not possible due to the presence of fresh thrombus. Of those in group 4, there were 11 grafts performed for claudication, 16 for popliteal aneurysms and 3 following lower limb trauma.

During the study period, there were 3802 angioplasties performed. The failure rate from angioplasty at our centre has been previously reported to be 2.3% (defined as requiring immediate surgical intervention for bleeding or ischaemia).¹⁰ The series reported here considers only those requiring infrainguinal bypass grafting and other emergency surgical procedures such as embolectomy or false aneurysm repair have not been included. Patients were considered for surgery in the event of a failed angioplasty (or early reocclusion) based on individual factors such as co-morbidity, presence suitable 'run off' vessels to graft and patient wishes.

The level of the graft was recorded as above knee femoropopliteal (AKFP), below knee femoropopliteal

Table 2. Pattern and level of disease in group 3

Clinical presentation	SFA	Popliteal	Infragenicular
Critical Ischaemia	26	7	12
Claudication	14	3	4

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