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Clinical Research

Multilevel Bypass Grafting: Is it Worth it?

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Background: Traditionally, multilevel arterial disease has been treated with an inflow procedure only but simultaneous multilevel bypass graft procedures have been attempted. However, these procedures are potentially high risk. We report our single-center experience of performing multilevel bypass grafts over the last 15 years.
Methods: We retrospectively identified patients undergoing simultaneous aortoiliac and infrainguinal bypasses between January 1996 and January 2011 at a single district general hospital.
Results: There were 32 multilevel procedures performed. Indication for surgery was acute ischemia in 10 (31.3%), critical ischemia without tissue loss in 10 (31.3%), with tissue loss in 10 (31.3%), and claudication in 2 (6.3%). In 23 (71.9%) cases inflow was restored using a direct iliofemoral or aortofemoral reconstruction. In the remaining 9 (28.1%), an extra-anatomic bypass was constructed. Two (6.3%) patients died within 30 days of surgery. Twenty-nine (90.6%) patients survived to discharge. Twenty-eight patients (87.5%) were alive 1 year after surgery. Limb salvage was 96.9%, 85.7%, and 75.9% at 30 days, 1 year, and 5 years, respectively. Twelve (37.5%) patients required a total of 19 further ipsilateral vascular procedures.
Conclusions: Our results demonstrate that multilevel bypass procedures can be performed with good long-term outcomes and acceptable mortality, in what is typically a high-risk group with extensive comorbidities. In patients with severe critical limb ischaemia and tissue loss, who have a combination of aortoiliac and infrainguinal disease, there are significant benefits to a primary multilevel grafting procedure.

INTRODUCTION

Peripheral vascular disease affects 1 in 5 people between the ages of 55 and 75 years, with 25% having symptoms of intermittent claudication.[1] Severe disease affecting multiple arterial segments is less common but causes more severe clinical features. Such ''multilevel'' arterial disease is present in >50% of patients requiring aortoiliac surgery[2–4] and is even more prevalent in patients presenting with critical limb ischaemia, where it contributes to the poor prognosis; in 1 study only 56% of patients were alive with both legs 1 year after diagnosis.[5]

The management of multilevel arterial disease is variable and depends on a number of patient factors and the surgical and radiologic expertise available. Traditionally, it has been treated with an inflow procedure only but this approach is often inadequate by itself and a further infrainguinal procedure is often required at a later date.[6,7]

In view of these relatively poor results, a number of surgeons have attempted simultaneous multilevel bypass grafting, combining an iliofemoral or aortofemoral procedure with an infrainguinal bypass. Early experiences using this combined approach were poor,[8] however later studies have demonstrated acceptable graft patency and limb salvage rates without excessive perioperative mortality.[9,10]

Relatively, little has been written on the subject over the last decade. This is in part due to the

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emergence of less invasive endovascular techniques. A number of authors have described the combined use of aortoiliac angioplasty and/or stenting with femoropopliteal bypass grafting showing good results.[11–13] However, not all inflow lesions are amenable to endovascular intervention and some patients will undoubtedly continue to require more extensive surgical reconstruction. We report our single center experience of performing multilevel bypass grafts over the last 15 years on patients who are not suitable for endovascular intervention.

MATERIALS AND METHODS

Thirty-two patients underwent multilevel bypass graft procedures between January 1996 and January 2011 at a large district general hospital. All the procedures were performed by or under the immediate supervision of 1 of 3 experienced vascular consultants. Information for analysis was obtained retrospectively from 2 sources, from a departmental vascular database and from the patients' case notes.

With the obvious exception of those patients requiring emergency procedures for acute limb-threatening ischemia, all cases were discussed at a multidisciplinary meeting involving surgeons and interventional radiologists. Patients with multilevel disease were generally considered for a multilevel procedure if either they were critically ischemic with tissue loss or they alternatively had very poor runoff from the planned distal anastomotic site of the inflow graft. A superficial femoral artery occlusion in the presence of a severely diseased profunda femoris artery, for example, would be considered an indication for a multilevel procedure. Our center has a very experienced interventional radiology department and all patients were considered for endovascular treatment. Endovascular treatment is generally the first line intervention for inflow disease if suitable, and most patients presenting with multilevel disease will undergo endovascular intervention as part of their therapy. All the patients included in this study were deemed by the multidisciplinary team not to be suitable candidates for endovascular therapy. In addition to these planned multilevel procedures, others were converted to a multilevel procedure intraoperatively as a result of operative findings or complications. Both groups of patients have been included in the study.

Categorical data were demonstrated by frequency and percentage, and continuous data were described using the mean or median. Survival, limb salvage, and patency were reported at 30 days and estimated at 1 year and 5 years using Kaplan–Meier estimates.

RESULTS

In total there were 32 multilevel procedures performed during the study period. Twenty-three (71.9%) patients were male and 9 (28.1%) female. The mean age was 68.7 years. The indications for surgery are shown in Table I. Fifteen (46.9%) patients had had previous vascular interventions (Table II). Median length of stay was 10.0 days (range 5–47 days) and mean follow-up was 69 months.

In 23 (71.9%) cases, the inflow was established using an anatomical direct aortofemoral or iliofemoral reconstruction. In the remaining 9 (28.1%) patients extra-anatomic bypasses were constructed (Table III). The multilevel procedure was unplanned in 6 cases. In each of these cases, the limb was acutely ischemic following a proximal grafting procedure, and a decision was made in the theater to perform an additional infrainguinal procedure. All but 1 inflow procedure was constructed using a prosthetic graft. In 1 case, an iliofemoral graft was constructed using reversed superficial femoral vein. Outflow reconstruction involved infrainguinal bypass to the above-knee popliteal in 18 (56.3%), below-knee popliteal in 11 (34.4%), and a distal vessel in 3 (9.4%). The graft material used for the outflow procedures is detailed in Table IV. Thirty-day, 1-year, and 5-year mortality rates, graft patency, and limb salvage rates are displayed in Table V.

Two patients died within 30 days of surgery and a further patient died on the same admission. In total, 29 (90.6%) patients survived to discharge. Of the 30-day mortalities, both patients underwent procedures for critical ischemia with tissue loss and both underwent ipsilateral iliofemoral reconstructions with femoropopliteal bypass. Both patients died of cardiac causes within 24 hr of surgery. The third patient died on day 36 of a gastrointestinal hemorrhage after an iliofemoral reconstruction with an above-knee femoropopliteal graft.

Twenty-eight patients (87.5%) were alive 1 year after their initial multilevel surgery. After successful discharge from hospital after primary surgery there was only 1 death within the subsequent year. This 76-year-old patient underwent a left axillofemoral and femoropopliteal bypass for critical ischemia. He had significant cardiac comorbidities and died of cardiac causes 5 months after surgery. In total, 18 (59.3%) patients were known to be alive at 5 years (Fig. 1).