

Axillofemoral Bypass using Vein Grafts for Complicated Peripheral Arterial Disease

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ABSTRACT

Introduction: Critical Limb Ischaemia (CLI) with tissue loss secondary to lower limb Peripheral Arterial Disease (PAD) requires consideration for intervention in the form of endovascular and / or open surgical procedures to achieve improved perfusion and limb preservation. An Axillo-Femoral Bypass (AxFB) is only considered in cases where an endovascular or abdominal surgical approach to aortoiliac disease is not possible or is deemed too hazardous. Such patients may have an unfavourable pattern of arterial disease, significant co-morbidities and / or a hostile abdomen. Although prosthetic grafts are typically employed for AxFB procedures, vein grafts are an alternative with a lower risk of infection. We present our experience of AxFB grafting using autologous venous conduits in a select group of patients with CLI and tissue loss in the context of significant co-morbidities and elevated infection risk.

Methods: A retrospective study of all unilateral AxFB grafts using autologous venous conduits performed at our limb salvage unit over a five year period (January 2014-December 2018) was conducted. Data is collected from written and electronic medical records as well as radiology, haematology and biochemistry reports.

Results: Seven unilateral AxFB procedures using vein grafts were performed on five patients with CLI and tissue loss. Two patients had a second AxFB on the contralateral side on a separate occasion for progressive disease. Four patients were male and one was female with an age range of 55-79 years. There were no surgical site infections and no perioperative deaths. Graft patency was 86% at one year and 71% at two years. Three out of seven grafts (43%) failed during follow up. Two patients with graft occlusion developed CLI and tissue loss, one required above knee amputation and the other further bypass surgery. Six patients achieved complete wound healing. One patient died from lung cancer.

Conclusion: Our results indicate that AxFB using an autologous venous conduit can be successful in patients with CLI and tissue loss in the context of significant co-morbidities and increased risk of infection. Further evidence is needed to support our findings and potentially stratify which patients would benefit from a venous, rather than a prosthetic, graft.

Keywords: Axillo-femoral bypass; Venous graft; Critical limb ischaemia; Peripheral arterial disease; Aortoiliac disease

ABBREVIATIONS

AF: Atrial Fibrillation; AxFB: Axillo-Femoral Bypass; CIA: Common Iliac Artery; SFA: Superficial Femoral Artery; PFA: Profunda Femoral Artery; IHD: Ischaemic Heart Disease; HTN: Hypertension; PAD: Peripheral Arterial Disease; DVT: Deep Venous Thrombosis; COPD: Chronic Obstructive Pulmonary Disease; MI: Myocardial Infarction; IVDU: Intravenous Drug User; CVA: Cerebrovascular Accident; TIA: Transient Ischaemic Attack; TASC: Inter-Society Consensus For the Management of Peripheral Arterial Disease.

INTRODUCTION

The incidence and prevalence of Critical Limb Ischaemia (CLI) secondary to Peripheral Arterial Disease (PAD) is reported to be around 400 cases per million population per year and one in 2500 respectively [1]. A significant proportion of these patients require intervention in the form of an endovascular and / or open surgical procedure as a limb saving, and often life saving, measure.

Axillo-Femoral Bypass (AxFB) grafting is reserved for patients in

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(1a)

(1b)

(1c)

Figure 1: Images of a patient who underwent left AxFB grafting followed by right AxFB grafting using autologous venous conduits in both instances. (1a) Left AxFB graft; (1b) Right AxFB graft and (1c) The left foot wound has completely healed and the right foot wound is healing with healthy granulation tissue at its base.

aortoiliac procedure, reducing surgical time and minimising the risk of complications, including infection.

All patients included in this study presented acutely with deteriorating wounds containing areas of necrosis and / or amorphous material that were clinically highly suspicious of infection or had microbiology confirmed infection. All patients were administered antibiotics on presentation that were continued after surgery.

Infection is one of the three major categories used to stage a threatened limb in the WIfI (Wound, Ischaemia and Foot Infection) classification system [2,19]. In a study of patients undergoing infrainguinal bypass for CLI, the presence of foot infection was identified as an independent predictor of major amputation [3]. In addition post-operative sepsis would be particularly hazardous in this population of comorbid patients with poor physiological reserve. Although a prosthetic graft is the usual conduit of choice in suprainguinal bypass, the use of an autologous venous graft for arterial bypass is less likely to be complicated by infection [3,20-23]. Venous grafts have been employed to address a variety of challenging clinical situations involving infection [20,24-27]. In this study, patients had an elevated risk of surgical wound complications including infection. Wound healing was potentially compromised

by general frailty, co-morbidity and poor physiological reserve in all patients. Surgical site scarring for one patient with a history of multiple iliofemoral vascular procedures and another with a history of intravenous drug use and multiple groin sinuses was an additional consideration for wound complications. In the patients with a low BMI there was additional concern that healing and immune function were impaired and a prosthetic graft may erode through the subcutaneous tissues and become exposed. Further, all patients possessed a source of sepsis with clinically suspected or proven infection in deteriorating lower limb wounds.

Autologous vein grafts were therefore employed in all cases to minimise the risk of surgical wound complications. Despite the high risk of infection in our patients there were no cases of surgical site wound complications or graft infection in this study (Tables 3 and 4).

There was one graft thrombosis at two weeks which required a return to theatre for thrombectomy to restore patency after which the patient recovered well. Graft stenosis developed in three cases (43%) for which successful endovascular intervention was performed. Advances in endovascular techniques have provided a minimally invasive way to address these problems and maintain graft patency [11,15,16]. A graft aneurysm developed in one case

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