

Case Report

Extra anatomical bypass grafting for limb salvage: a case report

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ABSTRACT

Extra-anatomical bypass grafting is a recognised method of lower limb re-vascularisation in high-risk patients who cannot tolerate aortic cross clamping, or in those with a hostile abdomen. Extra-anatomic bypasses are surgical arterial bypass procedures that circumvent the "normal" anatomical pathways. While such procedures can be performed in any vascular bed, the term most frequently is used to describe those bypasses that reroute blood to the lower extremities, avoiding intracavitary procedures. Initially introduced as alternative revascularization methods in the treatment of peripheral arterial occlusive disease and as techniques for bringing blood back to the lower extremities. Here, we present you a case of Peripheral Arterial Occlusive Disease where an Axillo-Femoral bypass was done.

Keywords: Bypass, Extra-anatomical, Limb salvage

INTRODUCTION

Extra-anatomical bypasses are surgical procedures performed at sites that do not correspond to the natural anatomy.¹ The main objective of extra-anatomical bypass is to simplify a large surgical procedure, such as aorto-femoral reconstruction, allowing a higher number of patients to be revascularized.² The term "extra-anatomic bypass" implies deliberate avoidance of the natural anatomic pathway. The most common examples of extra-anatomic bypass are axillo-femoral and femoro-femoral bypasses and their combination, the so-called axillo-bi-femoral bypass; in these procedures, abdominal entrance is deliberately avoided.³ The two categorical reasons for doing this are:

- To avoid "hostile" intra-abdominal pathologic features and
- To avoid the higher risk of transabdominal reconstruction in patients with serious visceral or systemic disease.⁴

In the former instance, there may be no reasonable alternative; in the latter, one is accepting a lesser degree and duration of benefit in exchange for lower mortality and morbidity rates.¹ Mortality and patency rates are the traditional measures of risk and benefit, respectively, and yet the literature reveals fourfold differences in operative mortality rate and a twofold difference in long-term patency for each of the three extra-anatomic bypasses.²

The criteria for indicating such procedures are generally the same currently adopted for classical revascularizations: critical ischemia (ischemic pain at rest and/or ulcerations) and incapacitating claudication, whose conservative treatment is not successful. On the other hand, candidates to revascularization due to any of these alternative techniques are patients considered as high risk for the classical procedure, whether due to increased anesthetic restrictions, or due to cardiac limitations that would make aortic clamping a high-risk procedure.³

There is also a group of patients that offers local difficulties to perform aorto-femoral reconstruction, related to femoral anastomoses or due to presence of infection in the inguinal region of previous aorto-femoral graft. Results of extra-anatomical bypasses range according to procedure and patients' general conditions.⁴

CASE REPORT



Figure 1: Pre-op and post-op MR angio of the patient.

A 60-year-old diabetic presented with a non-healing ulcer in his Right foot following disarticulation of 4th toe with severe spreading cellulitis in the leg with critical ischemia. He was very obese, hypertensive and had nephropathy. He was also a chronic smoker with compromised lung functions. He had features of Ischemia in both his lower limbs. On clinical examination both his femoral pulses were not palpable.

Routine blood investigations were normal. Serum creat. - 2.1. MR angio showed total occlusion of the aorta at the level of the origin of the renal arteries with reformation in the common femoral on the right side. Again, he had occlusions distally hence had a poor run off.

DISCUSSION

Since Freeman and Leeds first described the femoro-femoral crossover graft in 1952 and later, Blaisdell and Hall along with Louw proposed the now well-established axillo-femoral bypass in 1963, extra-anatomical bypass procedures have been a recognized method of lower limb revascularization in patients with aorto-iliac disease.¹⁻³ At present, patients are increasingly being offered percutaneous angioplasty and stenting for lower limb ischemia due to stenotic arterial disease. However, surgical approaches are still appropriate and have a major role to play in patients with severe symptoms due to long occlusions of the aorto-iliac segments or where angioplasty has failed. Furthermore, Whatling et al, have recently shown better long-term patency following femoro-femoral grafting when compared to angioplasty with stenting for aorto-iliac disease.⁴



Figure 2: Per-op photo showing the ringed PTFE graft being anastomosed with the femoral artery.

Although the surgical gold standard for aorto-iliac disease is a direct aorto-iliac/femoral replacement, extra-anatomical grafts have a place where patients have poor cardiac or respiratory reserve, who cannot tolerate a trans-abdominal approach or in those with a hostile abdomen where a direct approach would be contraindicated due to the extent of abdominal pathology.



Figure 3: Pre-op and post-op photos of the wound over the foot.



Figure 4: SSG was done and it has taken up very well.

Ideally this patient required an Aorto - femoro - popliteal bypass for correction of Ischemia. Approaching aorta trans peritoneally was fraught with many complications due to his obesity and co morbid conditions. Further due to poor run off distally the longevity of the graft was also not guaranteed. Hence, it was decided to go ahead with an extra anatomic bypass.

Surgical procedure

EABP from the right axillary artery to the right common femoral artery using a long ringed PTFE graft brought subcutaneously was done.

Post-operative period

He tolerated the procedure well and following the surgery perfusion to the right foot improved well. The wound granulated well and the SSG done to the ulcer was successful. He was asymptomatic and claudication had disappeared.

CONCLUSION

With acceptable morbidity, long-term primary patency and survival rates are obtainable in patients suitable for extra-anatomical bypass surgery despite having significant co-morbidities. 5-year patency rates in those that survive axillary procedures is as good as those undergoing femoral procedures. Furthermore, surviving patients who evade amputation within a year have an

excellent chance of long-term limb salvage. Thus, in selected situations, extra anatomic bypass helps in limb salvage.

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