



Case Report

Coverage of Exposed Groin Vascular Grafts: Flaps for Different Situations—A Case Series

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Abstract

Introduction: Groin is the commonest site of graft infections in vascular surgery. This is a potentially catastrophic situation and may lead to limb loss and even death. Management of exposed vascular grafts in the groin wound poses a challenge to the surgeon. Thorough debridement and early coverage of the exposed vascular graft with a flap salvages the limb and has long been recommended. The purpose of our study was to assess the significance of early coverage of exposed vascular grafts with muscle flaps. We have employed different flaps for different situations in groin wounds with exposed vascular grafts depending on the length of the vessel or the graft exposed and the surrounding defect.

Methods: Thirteen cases were treated over a two years period for wounds with exposed vascular grafts which were primarily covered with flaps following debridement. Flaps were chosen on the basis of the situation and the length of the exposed vascular graft and the surrounding tissue. For exposed vascular grafts without skin loss, gracilis muscle flap was preferred (6 cases) while patients with exposed vascular graft in the upper third of the groin and thigh region with skin and soft tissue loss, a pedicled tensor fascia lata flap was used (4 cases). Remaining three patients had their vascular graft exposed beyond upper third of the groin and upper thigh region and rectus abdominis muscle flap was used in these patients.

Results: All flaps healed well without complications. At a mean follow up period of 16 ± 8 months, none of the flaps showed any evidence of failure or signs of infection. One patient had of vascular graft failure underneath and had to undergo secondary procedure.

Conclusion: The use of muscle flaps for the management of complex groin wounds with exposed vascular grafts provides an effective and safe coverage with good long term results. The choice of a flap is important depending on the size of the wound and exposed vascular graft that decides the long term result and outcomes. Thus, the patient morbidity is reduced and the limb can be salvaged.

Keywords

Exposed vascular graft; Groin; Flaps

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Introduction

Vascular surgical procedures have gained wide spread use with the adoption of endovascular aneurysm repairs, and complex hybrid reconstructions for atherosclerotic occlusive disease in addition to their traditional use in bypass procedures, endarterectomies and access procedures [1]. However groin incisions are complicated by wound dehiscence and infections in around 5-10% of patients following these procedures [1]. Exposed vascular grafts in the groin region following vascular surgery may be life threatening and may result in morbidity, frequent surgical manipulations and even loss of limb and life of the patient. Adequate treatment of the infected groin wounds with exposed vascular grafts include thorough debridement, immediate coverage with a well vascularised muscle flap and antibiotics according to sensitivity pattern. Graft preservation is to be considered when it is patent and the patient has no evidence of septicemia [1]. However, some patients with very high preoperative risks from additional cardio-respiratory problems, malnutrition and sepsis may be precluded as they are very poor candidates for surgery and limb saving procedures in them may prove to be life threatening. The goal of mobilizing a muscle flap is to provide adequate coverage of the underlying vessels or graft, and to eliminate or control the infection in a single procedure that includes definitive closure of the donor site.

For a period of 2 years, we have used a number of muscle flaps (pedicled gracilis, tensor fascia lata and rectus abdominis flap) for this purpose. In this case series, we describe our results of using all these muscle flaps for coverage of specific defects, the reasons for our preference and a long term outcome.

Subjects and Methods

Thirteen flap procedures were performed at our hospital from August 2009 to July 2011. These were performed between two to six weeks of revascularisation surgery of the limb in patients with graft exposure due to breakdown of the incision line. Patient demographics, the initial indication for intervention, the type of intervention and prosthesis used, the infectious organism, antibiotics used, the length of the vascular prosthesis or vessel exposed, the choice of flap and the outcome at a long term follow up were recorded and analysed. Pre operatively, the patient was assessed for scarring in the abdomen, inguinal region and around the inner aspect of thigh. All cases treated by us had unilateral affection of limbs only.

All patients had their swab and blood cultures sent and suitable antibiotics were started just prior to or on the day of operation. The waiting period for each patient was approximately 1-3 days while the patient was investigated and culture reports were awaited. Patients were assessed pre-operatively regarding the viability of the vascular graft (in consultation with the operating vascular surgeon), the extent of the defect, and the suitability of the appropriate flap. The wound was again assessed per-operative, thorough debridement done, swabs were obtained, and flap coverage was planned. All flaps were elevated by the standard method. In six cases with exposed vascular grafts with adequate skin cover, gracilis muscle flap was preferred [1], while in four cases with exposed vascular graft in the upper third of the

Table 1: Patients and Procedures.

Sl. No.	Age	Sex	Assoc. Diseases	Clinical Presentation	Prosthetic Material	Culture	Antibiotic used	Complications
1	45	M	DM	Infected femoropopliteal bypass	VEIN GRAFT	S.aureus	Levofloxacin, Amikacin	None
2	58	M	DM	Infected femoropopliteal bypass	VEIN GRAFT	Ps. Aeruginosa	Amp-Sulbactam	None
3	69	F	DM	Femorofemoral bypass	PTFE	E. fecalis	Levofloxacin, Tobramycin	None
4	47	M	DM+ HTN	Aortofemoral bypass	Dacron	Nil	Amoxycillin	None
5	54	M	DM	Femorofemoral bypass	PTFE	Nil	Amoxycillin	None
6	62	M	NIL	Post traumatic	VEIN GRAFT	S. epidermidis	Levofloxacin	None
7	67	M	DM	femoropopliteal bypass	VEIN GRAFT	Nil	Amoxycillin	None
8	54	M	NIL	Femorofemoral bypass	PTFE	Ps. Aeruginosa	Meropenem, Piperacillin-tazobactam	Required 2nd procedure for blocked bypass
9	49	M	IHD	Femorofemoral bypass	PTFE	S.aureus	Vancomycin	None
10	45	M	DM	femoropopliteal bypass	VEIN GRAFT	S.aureus	Vancomycin	None
11	47	M	NIL	Post traumatic	VEIN GRAFT	Kl. Pneumoniae	Levofloxacin	None
12	66	M	HTN	Post traumatic	VEIN GRAFT	E. fecalis	Piperacillin-Tazobactam	None
13	57	M	DM	femoropopliteal bypass	VEIN GRAFT	S.aureus	Piperacillin-Tazobactam	None
Mean	55.4							

M= Male; F = Female; DM = Diabetes mellitus; IHD = Ischemic heart disease; HTN = Hypertension; PTFE = Polytetrafluoroethylene

groin with skin and soft tissue loss, a tensor fascia lata myo cutaneous flap was done. The remaining 3 patients had their vascular graft exposed beyond upper third of the groin and upper thigh region. In these patients, a rectus abdominis muscle flap was done.

Results

All patients were referred from the Department of Cardiovascular & Thoracic Surgery of our institute. The average waiting period was two to six weeks from the primary procedure till referral to our department. A total number of thirteen patients were treated. The average age of presentation was 55 years. Only one of the patients was a woman and rest were men. Eight patients were diabetic (61%),



Figure 1: Gracilis muscle flap. Gracilis muscle flap for exposed vascular graft in the groin.



Figure 2: Rectus abdominis muscle flap. Rectus abdominis muscle flap for exposed vascular graft in the groin.

two hypertensive (15%), one with ischemic heart disease (8%) and three (23%) had no associated ailments. Five patients had infected femoropopliteal bypass, four had femorofemoral bypass, three had post traumatic exposure and one had aortofemoral bypass. Vein graft was used in eight patients, PTFE prosthesis was used in four and Dacron graft was employed in one. The culture report revealed organisms in ten patients and three had a negative report. All flaps were planned based on a protocol formulated at our institute that helped us to provide adequate coverage for the exposed vascular grafts without any failure. Long term results after follow up for a period of 16 ± 8 months was convincing. One patient with femorofemoral bypass required a second procedure for the blocked bypass.



Figure 3: Tensor fascia lata myocutaneous flap. Tensor fascia lata myocutaneous flap for exposed vascular graft in the groin.

Discussion

Groin is the commonest site for graft infections in vascular surgery [2]. Complications occurred in 10% patients in their series with the highest occurring in femoral popliteal/tibial and pedal bypasses (44%) [3] with a mortality rate of 10 to 30% and amputation rates up to 70% when early flap coverage was not provided [4]. Wound complication and wound infection are significantly associated with development of prosthetic vascular graft infection that identify the patients at increased risk of developing subsequent infection [5]. The recurrence of infection is independent of graft material, microbiology or graft location. Debridement and muscle coverage of exposed or infected vascular grafts produced clinical salvage [6].

Muscle flaps for infected groin wounds with exposed vascular prosthesis are well documented. Rectus abdominis, gracilis, tensor fascia lata, Sartorius, rectus femoris, anterolateral thigh flap/vastus lateralis are safe and effective flaps for coverage in prosthetic graft infection [7-12]. However, the choice of flap depending on the size of the exposed vascular graft and surrounding tissue is a new concept that we have followed in this study. Different types of muscle flaps provide different benefits, and they can be tailor made to meet the situation. A pedicled muscle flap provides satisfactory single stage wound coverage with obliteration of dead space, improving local wound healing environment by increasing local blood flow and thereby increasing the oxygen tension, antibiotic penetration and macrophage activity [13]. It also provides a secondary barrier to exposure in case of a suture dehiscence. Gracilis is a slender muscle that covers only a small area if not scored and is suitable for coverage of vascular prosthesis when there is no skin deficit. This muscle can be accommodated in the suture line. Though the overlying skin can be primarily closed, owing to wound dehiscence and active infection, this flap is a definitive procedure in such cases. Following debridement and flap coverage, the wound can be primarily closed over the muscle flap to give a satisfactory healing. Tensor fascia lata flap is a good option for coverage of wound in upper third of the groin and thigh where gracilis would be too slender and rectus abdominis muscle would be a radical procedure considering the size of the defect when other options are available. Rectus abdominis serves as a good flap for coverage of defects or wounds extending more than upper third of the groin region and thigh as this muscle flap has an enormous size with

excellent vascularity and capable of covering up to lower third of the thigh wound, which at times is the only option available in such large defects. The mentioned algorithm provides a simple, easily applied technique to the choice of flaps for coverage of the wounds, thereby reducing the morbidity, limb loss and mortality to the patient. Now the trend is gradually changing towards providing prophylactic muscle flap coverage during primary surgical procedures for groin as this lessens the financial burden and reduces the hospital stay for the patient [14-19].

Conclusion

The choice of flaps for coverage of the groin defect with exposed vessel or vascular graft is important. The Muscle flaps provide increased vascularity and antibiotic penetration and also prevents graft exposure in case of wound breakdown. For wounds with exposed vascular grafts without skin loss, we preferred a gracilis muscle flap over which the skin cover can be provided by primary suturing. For wounds over upper third of groin and thigh, our preference was a pedicled TFL flap that gives a good pliable skin cover. Rectus abdominis flap gives a very good coverage of muscle with SSG for wounds extending below upper third of groin and thigh.

References

1. Morasch MD, Sam AD 2nd, Kibbe MR, Hijawi J, Dumanian GA (2004) Early results with use of gracilis muscle flap coverage of infected groin wounds after vascular surgery. *J Vasc Surg* 39: 1277-1283.
2. Williams IM, Milling MA, Shandall AA (2003) Vascularised muscular flaps and arterial graft infection in the groin. *Eur J Vasc Endovasc Surg* 25: 390-395.
3. Kent KC, Bartek S, Kuntz KM, Anninos E, Skillman JJ (1996) Prospective study of wound complications in continuous infrainguinal incisions after lower limb arterial reconstruction: incidence, risk factors, and cost. *Surgery* 119: 378-383.
4. Herrera FA, Kohanzadeh S, Nasseri Y, Kansal N, Owens EL, et al. (2009) Management of vascular graft infections with soft tissue flap coverage: improving limb salvage rates—a veterans affairs experience. *Am Surg* 75: 877-881.
5. Antonios VS, Noel AA, Steckelberg JM, Wilson WR, Mandrekar JN, et al. (2006) Prosthetic vascular graft infection: a risk factor analysis using a case-control study. *J Infect* 53: 49-55.
6. Evans GR, Francel TJ, Manson PN (1993) Vascular prosthetic complications: success of salvage with muscle-flap reconstruction. *Plast Reconstr Surg* 91: 1294-1302.
7. Alkon JD, Smith A, Losee JE, Illig KA, Green RM, et al. (2005) Management of complex groin wounds: preferred use of the rectus femoris muscle flap. *Plast Reconstr Surg* 115: 776-783.
8. Maser B, Vedder N, Rodriguez D, Johansen K (1997) Sartorius myoplasty for infected vascular grafts in the groin. Safe, durable, and effective. *Arch Surg* 132: 522-525.
9. Graham RG, Omotoso PO, Hudson DA (2002) The effectiveness of muscle flaps for the treatment of prosthetic graft sepsis. *Plast Reconstr Surg* 109: 108-113.
10. Kaufman JL, Shah DM, Corson JD, Skudder PA, Leather RP (1989) Sartorius muscle coverage for the treatment of complicated vascular surgical wounds. *J Cardiovasc Surg* 30: 479-483.
11. Michael N. Mirzabeigi (2011) Optimizing Flap Choice in the Complex Groin Wound: A Review of 175 Consecutive Cases.
12. Perler BA, Vander Kolk CA, Dufresne CR, Williams GM (1991) Can infected prosthetic grafts be salvaged with rotational muscle flaps? *Surgery* 110: 30-34.
13. Calderon W, Chang N, Mathes SJ (1986) Comparison of the effect of bacterial inoculation in musculocutaneous and fasciocutaneous flaps. *Plast Reconstr Surg* 77: 785-794.


14. Fischer JP, Nelson JA, Mirzabeigi MN, Wang GJ, Foley PJ 3rd, et al. (2011) Prophylactic muscle flaps in vascular surgery. *J Vasc Surg* 55: 1081-1086.
15. Fischer JP, Nelson JA, Rohrbach JI, Wu LC, Woo EY, et al. (2012) Prophylactic muscle flaps in vascular surgery: the Penn Groin Assessment Scale. *Plast Reconstr Surg* 129: 940e-949e.
16. Chateau F, Duisit J, Lengelé B, Vanwijck R (2010) Techniques for coverage of infected vascular grafts in the groin. *Acta Chir Belg* 110: 487-491.
17. Dosluoglu HH, Loghmanee C, Lall P, Cherr GS, Harris LM, et al.(2010) Management of early (<30 day) vascular groin infections using vacuum-assisted closure alone without muscle flap coverage in a consecutive patient series. *J Vasc Surg* 51: 1160-1166.
18. Qi F, Zhang Y, Gu J (2009) Repairs of complex groin wounds with contralateral rectus abdominis myocutaneous flaps. *Microsurgery* 29: 199-204.
19. Taylor SM, Weatherford DA, Langan EM 3rd, Lokey JS (1996) Outcomes in the management of vascular prosthetic graft infections confined to the groin: a reappraisal. *Ann Vasc Surg* 10: 117-122.

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