

Original Article

Sartorius Myoplasty for Groin Infections Following Prosthetic Vascular Graft

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ABSTRACT

Background: This study reports our experience with sartorius myoplasty in the management of groin prosthetic graft infection. The procedure was used only in early infected, small-sized groin wounds with very limited interruption of blood supply.

Patients and Methods: Between February 1994 and February 1999, nine patients underwent sartorius myoplasty (six women and three men; mean age 56 years; range 25-72 years). All cases were followed up for 4-42 months (mean = 17 months) to assess wound healing,

graft patency and hospital stay.

Results: All patients had excellent direct wound healing. No patients presented with recurrence of infection or manifestations suggesting muscle necrosis. The mean hospital stay was 13 days (range = 10 to 19 days).

Conclusion: Sartorius myoplasty is useful in eradicating infections from infected groins with prosthetic graft and can decrease the hospital stay when carefully performed and small sized wounds are selected.

KEYWORDS: grafts, groin, infected, myoplasty, sartorius

INTRODUCTION

Graft infection, although uncommon, is a serious complication of reconstructive vascular surgery that is associated with a high mortality and limb loss in a large percentage of the survivors^[1]. The groin is the most common site for this infection^[2]. Traditional management of infected arterial grafts has included total graft excision to prevent persistent infection resulting in non-healing wounds, systemic sepsis and anastomosing hemorrhage^[2,3]. Such management is associated with a 50% mortality rate and a 20-75% amputation rate^[4-6]. The principles that guide operative planning reflect the complex balance between the eradication of infection and the avoidance of unnecessary morbidity and mortality^[7]. In view of this, alternative treatments, such as graft excision and *in situ* replacement with either autogenous arteries or veins, cadaveric homografts veins, local drainage, debridement, and continuous catheter irrigation with antiseptic or antibiotic solution, as well as debridement and wound closure with muscle flaps have been explored^[8]. Advancement of a muscle flap onto an exposed infection has been reported as an important adjunct to achieve successful graft preservation^[2,9]. On such reconstruction, using the rotated ipsilateral sartorius muscle, appears to be technically straightforward, effective and associated with minimal residual function deficit^[11,10-14]. On the other

hand, this muscle is known to have a tenuous segmental blood supply, mainly from a diseased superficial femoral artery, and it is not uncommon to be complicated with muscle necrosis^[3]. During a 6-year period ending in February 1999, nine patients who presented with infected prosthetic grafts in the groin underwent sartorius myoplasty. Their cases were reviewed to evaluate the benefit of this helpful procedure.

PATIENTS AND METHODS

Nine sartorius myoplasties were performed in six women and three men, ranging in age from 25 to 72 years (mean = 56 years). All patients had groin prosthetic graft infection of Szilagyi type III (i.e., sepsis involved the arterial graft^[6]). Seven patients presented within 30 days post-operatively and two presented after 3 and 8 months, respectively. The size of infected groin wounds ranged from small discharging sinuses (one case) to a 2-inch wound with gapping edges. Diagnosis of infection included clinical evaluation and swabs from wound discharge, which were tested for culture and sensitivity.

A CT scan was done in one case and all cases underwent ultrasound (Duplex) scan in order to assess the extent of infection and perigraft collection. These were found in four cases. A contrast sinogram was done in one case to document the extent of the wound sinus into the vascular anastomosing site.

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Sepsis affected five aorto-femoral grafts (Dacron), three femoro-popliteal bypasses constructed with polytetrafluoroethylene (PTFE) and one femoral artery underwent angioplasty with PTFE patch (Table 1). *Staphylococcus aureus* was isolated from five cases, and *Pseudomonas aeruginosa* was cultured in three cases. One case had mixed gram positive and gram negative organisms.

All patients underwent wound exploration, generous debridement and sartorius myoplasty. Sepsis involving the anastomosis line was found in one case. After performing the debridement, cavities found to be larger than 2-inches were considered for another procedure (rectus femoris muscle flap) and were not included in this study. Lymphorrhea was an associated condition in two cases in which 1 ml of a 1% solution of isosulphane blue was injected into the web space of the affected limbs one hour prior to the surgical exploration. This procedure was very helpful for the localization and ligation of the site of the lymphatic leak. The sartorius muscle used was identified, detached from its origin and one or two of its segmental blood vessels were divided. The free lateral border was mobilized and rotated medially to cover the exposed graft and fixed with absorbable sutures. The wounds were primary closed in eight cases; one case needed a split skin graft. All patients were followed by physical examination and Doppler examination every three months for a year and then every six months thereafter. The mean follow-up was 17 months (range: 4-42 months).

RESULTS

A retrospective analysis of predisposing factors for graft sepsis is shown in Table 1. All patients had one or more of these risk factors. Diabetes Mellitus was the most common factor and was found in six patients. Five patients were under treatment with immunosuppression and chemotherapy for different diseases, including Systemic Lupus

Erythematosus (SLE), rheumatoid arthritis and scleroderma. Foot ulcers were present in four cases and one patient had a urinary tract infection (UTI) caused by the same organism isolated from these ulcers. Groin hematoma occurred in three cases and redo surgery in two cases.

Complete wound healing was achieved in all cases. Hospital stay after the sartorius myoplasty ranged from 10 to 19 days (mean = 13 days). There were no significant complications from this procedure. The associated lymphorrhea in two cases was treated successfully with the aid of isosulphane blue injections. No patients presented with recurrence or further local complications from their nicely healed groins. One patient, however, had an above-knee amputation five months after the operation from occlusion of the graft secondary to outflow obstruction. Two patients died 11 and 20 months postoperative due to myocardial infarction.

DISCUSSION

Although synthetic vascular graft infections are a relatively uncommon complication of peripheral vascular surgery, such infections may lead to the loss of an extremity or to death^[2]. Veith was one of the first to suggest that partial or total graft preservation can be a treatment option if the infection is localized to the groin and if all anastomoses are intact^[15,16]. The use of a local muscle flap in conjunction with thorough wound debridement aimed at "sterilizing" the infectious foci, such as chronic osteomyelitis^[17] has offered an alternative successful strategy for the management of localized prosthetic vascular graft infections^[10]. It seems that muscle flaps work by increasing local tissue oxygenation and phagocytic activity, decreasing wound bacterial counts, augmenting the delivery of antibiotics to the site, and eliminating dead space^[10,18-21].

Transposition of the sartorius muscle was first reported in 1948 to cover femoral vessels after inguinal lymph node dissection^[22] and has, since

Table 1
Graft sepsis and risk factors

	Sex	Age	Graft	Material	Lymphorrhea	DM	SLE	Rheumatoid	Scleroderma	Foot ulcer	UTI	Groin hematoma	Redo surgery
1	F	25	Patch angioplasty	PTFE	-	Yes	Yes	-	-	-	Yes	-	-
2	M	56	Femoro-popliteal	Dacron	Yes	Yes	-	Yes	-	Yes	-	-	-
3	F	68	Aorto-femoral	PTFE	-	-	-	-	-	Yes	-	Yes	-
4	F	64	Aorto-femoral	PTFE	-	Yes	-	Yes	-	-	-	-	Yes
5	F	52	Aorto-femoral	PTFE	-	Yes	-	-	-	-	-	Yes	Yes
6	M	72	Aorto-femoral	PTFE	-	-	-	-	-	Yes	-	Yes	-
7	F	49	Femoro-popliteal	Dacron	Yes	Yes	Yes	-	-	-	-	-	-
8	F	54	Femoro-popliteal	Dacron	-	Yes	-	-	Yes	-	-	-	-
9	M	63	Aorto-femoral	PTFE	-	-	-	-	-	Yes	-	-	-

PTFE: Polytetrafluoroethylene; DM: Diabetes Mellitus; SLE: Systemic Lupus Erythematosus; UTI: Urinary Tract Infection

then, been the most popular method of muscle coverage of infected vascular surgical wounds^[8,10-14]. There are, however, strong opponents who believe there are several limitations for this procedure. This muscle receives most of its segmental blood supply from 8-11 vascular pedicles from the diseased superficial femoral artery^[8-23]. Division of more than three pedicles has been reported to result in necrosis of a part of the muscle flaps^[8,10,23,24]. Subsequently, the transposable portion of this muscle is expected to be small in size. On the basis of these comments, this procedure was performed on a group of patients who presented with small-sized complicated groin wounds. It was planned not to divide more than two vascular pedicles during the mobilization of the proximal portion of the sartorius muscle. Usually these cases present early with groin sepsis as noticed in most of the cases (7/9 cases).

Approximately 50% of all graft infections manifest within one month of operation^[6,15,25]. Consequently, the proportion of patients potentially in need of this procedure is not low. This series shows how sartorius myoplasty provides dependable soft tissue coverage to the wound and may shorten hospital stays^[8] with proper selection of small-sized wounds and careful mobilization of the muscle. Al-Salman and Rabee et al., reported that similar cases were managed without sartorius myoplasty for a period of three to five weeks^[26]. The mean hospital stay in these cases was 13 days reflecting the benefit of this useful procedure. A randomized prospective controlled trial including the two groups, however, is needed to confirm this finding. There is no doubt that, in the case of larger defects, it is believed rotation of the muscle flap from a separate, clean anatomic bed, such as rectus abdominis or rectus femoris muscles, represents a superior approach when compared with local sartorius myoplasty^[8].

Early studies showed a high incidence of *Staphylococcus aureus*, which is thought to be the leading pathogen in graft infection^[6,25]. Recently several series, as well as this report, have shown the reporting of increasing numbers of gram-negative organisms^[2,10,15]. This can be explained by the increasing predisposition for vascular graft infection in the immuno-compromised patients, especially those with diabetes^[8]. It may be worth investigating the use of sartorius myoplasty as an adjuvant prophylactic procedure during the primary bypass operation in the group of patients having multiple risk factors, including immunosuppression, re-do surgery and thin patients with low subcutaneous fats in the groin. It is believed that secondary operations involving the inguinal region are associated with a significant

morbidity that includes infection, lymphatic obstruction and lymphorrhea^[27]. Prophylactic sartorius myoplasty is a known procedure in inguinal lymphadenectomy^[22] and it is reported as a preventive measure during re-operation on patients in poor general condition^[27]. A prospective controlled clinical trial is needed to establish the benefit of such prophylactic procedures.

The localization of human lymphatic with vital dyes was first described by Huddack et al. in 1933^[29]. In 1979 Kwann et al. described the use Evan's blue in the management of postoperative lymphatic leaks after arterial reconstruction^[30]. Isosulphan blue is selectively absorbed by lymphatic staining and, unlike Evan's blue, does not stain the surrounding tissue, obscuring disrupted lymphatic channels^[31]. This technique, as reported before^[26], was very useful to get rid of the associated lymphorrhea by easy identification and ligating the sites of lymphatic leak.

Conclusions include that infection can be eradicated from infected groins containing prosthetic grafts without graft excision avoiding the subsequent morbidity and mortality. Sartorius myoplasty has a limited but definite role in the treatment of such small sized infected groin wounds with careful mobilization and minimal interruption of its segmental blood supply. Its benefit in decreasing the hospital stay is clear and obvious.

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