

# The Sartorius Muscle Transposition: A Brilliant Solution for Infected Groin Wounds Including Vascular Conduits

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## ABSTRACT

**Background:** Managing exposed groin vascular grafts after vascular interventions can be challenging. Rescuing these conduits saves a patient's extremity and sometimes their life.

**Objective:** This study aimed to emphasize the efficacy and safety of the sartorius muscle flap for the salvage of infected groin wounds.

**Patients and methods:** This prospective study included 5 patients with infected or threatened groin wounds after femoral artery open intervention, who underwent sartorius muscle flap surgery between January 2020 and December 2022 at Mataria Teaching Hospital, Cairo, Egypt.

**Results:** This study presents the outcomes of utilizing sartorius muscle flaps for managing infected or at-risk femoral wounds. The initial surgeries involved femoral thrombectomy in one trauma case, femoral artery repair for one patient with a femoral pseudoaneurysm post-PCI, and femoropopliteal bypass with a saphenous graft in three patients. Following the sartorius muscle flap procedures, all patients achieved complete wound healing. Primary wound closure was successfully attained in all five cases, with an average healing duration of one month. There was no failure in the vascular reconstructions, observed over a median follow-up period of six months.

**Conclusion:** The use of sartorius muscle flaps by vascular surgeons can aid in the healing of infected groin wounds while preserving graft patency and ensuring limb salvage.

**Keywords:** Sartorius muscle flap, Vascular graft, Groin infection.

## INTRODUCTION

Groin incisions frequently lead to complications with femoral wounds. When such complications arise, various muscle flaps, alongside thorough local débridement, can be utilized to accelerate wound healing and protect vascular grafts. To address femoral wounds, flaps from the sartorius, gracilis, rectus femoris, and rectus abdominus muscles have been used. Sartorius flaps, in particular, are technically straightforward for vascular surgeons due to their familiarity with the anatomy and exposure required<sup>[1]</sup>.

This study aimed to emphasise the efficacy, simplicity and competency of sartorius muscle flap for salvage of infected groin wounds.

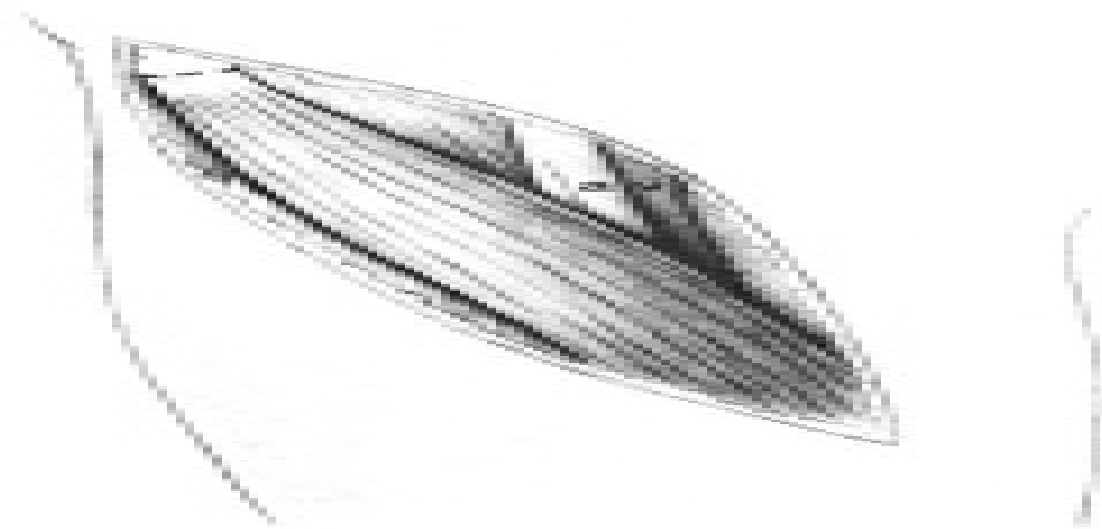
## PATIENTS AND METHODS

**Study design and population:** This prospective study included 5 patients with infected or threatened groin wounds after femoral artery open intervention, who underwent a Sartorius muscle flap. All patients had open surgery on the common femoral artery. The indication for the sartorius muscle flap was signs of groin wound infection, such as femoral wound dehiscence, serous or purulent discharge from the femoral wound, or failure to

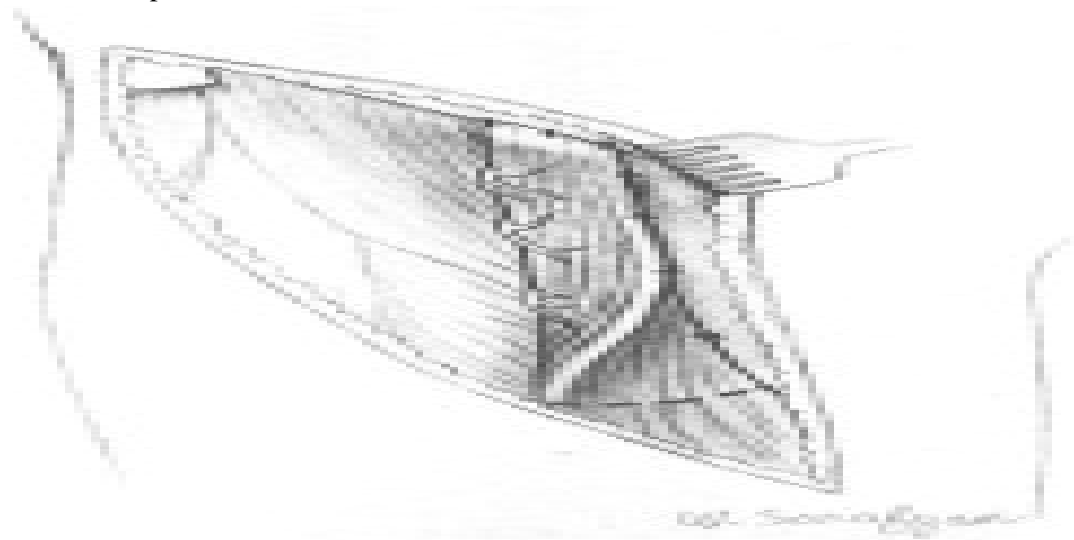
cover the femoral artery after open surgery. The study was conducted at Mataria Teaching Hospital, Cairo, Egypt, between January 2020 and December 2022, with a follow-up period of up to 6 months.

**Preoperative assessment:** Patients underwent a full history taking and detailed examination. Written informed consents for the procedure and the study was obtained from all patients. Groin wound swabs were taken intraoperatively from all patients and sent for culture and sensitivity.

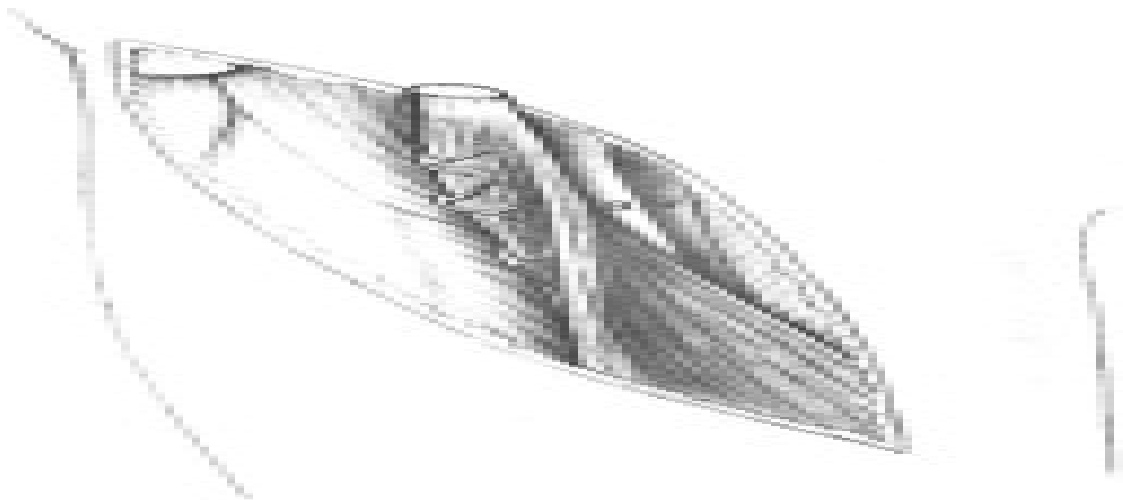
**Technique:** The sartorius muscle flap procedure involved mobilizing the muscle along its lateral edge to maintain the medially based blood supply. The primary vascular supply is located approximately 6.5 cm distal to the anterior superior iliac spine. The muscle is then detached from its origin at the anterior superior iliac spine<sup>[2]</sup>. It is subsequently rotated 180° along its medial axis, preserving the medial vascular bundle<sup>[3]</sup>. Finally, the tendinous portion of the muscle was anchored to the inguinal ligament, allowing the muscular flap to cover the femoral vessels<sup>[4]</sup>.



**Figure (1):** The sartorius muscle was exposed, with its tendon detached at the dotted line. The femoral artery (*a*) and vein (*v*) are visible on the medial aspect of the wound <sup>[5]</sup>.



**Figure (2):** The lateral and posterior surfaces of the muscle were mobilized, revealing the vascular pedicles entering the medial and posterior surfaces of the muscle. These pedicles remained intact and attached to the medial surface <sup>[5]</sup>.



**Figure (3):** The rotated muscle was reattached to the inguinal ligament and perivascular soft tissues using interrupted monofilament sutures. The vascular pedicles remained intact. The dotted line indicated where the muscle could be completely transected to allow full rotation if the muscle belly which was unusually hypertrophied <sup>[6]</sup>.

**Postoperative:** All patients were initially placed on empirical antibiotics, followed by antibiotics tailored to culture and sensitivity results. All patients remained in the hospital for at least 10 days until there was complete coverage of the femoral artery and the conduit with healthy granulation tissue, and until there was no discharge.

**Ethical considerations:** The study was done after being approved by the Research Ethics Committee, Vascular Surgery Department, Mataria Teaching Hospital, Cairo, Egypt. All patients provided written informed consents prior to their enrolment. The consent form explicitly outlined their agreement to participate in the study and for the publication of data, ensuring protection of their confidentiality and privacy. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

## RESULTS

This study reported the results of five sartorius muscle flaps performed to treat infected or threatened femoral wounds. The initial operations included a femoral thrombectomy in a 25-years-old trauma patient, femoral artery repair in a 45-years-old patient with a femoral pseudoaneurysm post-PCI, femoropopliteal bypass with a saphenous graft in two diabetic patients, and femoropopliteal bypass with a synthetic graft in one diabetic hypertensive patient. One trauma patient had unhealthy groin skin with exposed femoral artery and inadequate coverage. The patient post-PCI had a pseudoaneurysm with gangrenous groin skin, exposing the femoral artery repair. The three femoropopliteal bypass patients showed signs of wound infection with purulent discharge. Following the sartorius muscle flap procedures, complete wound healing occurred in all patients. Primary wound closure was achieved in all five patients, with a mean healing time of one month. There was no loss of vascular reconstructions, with a median follow-up of six months.

## DISCUSSION

In 1948, the sartorius muscle transposition technique was introduced to cover exposed femoral vessels following inguinal lymph node dissection<sup>[1]</sup>. This approach had since been utilized for treating groin infections<sup>[2,3]</sup>. Typically, the sartorius muscle was divided at its origin, mobilized medially, and then reattached to the inguinal ligament and femoral sheath<sup>[4]</sup>. The superficial femoral artery enters the sartorius muscle from its medial border, supplying it with a segmental blood supply from 8 to 11 vascular pedicles.

If more than three pedicles are divided, necrosis of the mobilized muscle flap may occur<sup>[7]</sup>. This risk is heightened in the presence of prosthetic material, as necrotic muscle often becomes infected, potentially leading to catastrophic complications at the vascular suture line<sup>[8]</sup>. The sartorius muscle is the preferred choice for muscle rotation due to its accessibility and the fact that its mobilization does not result in functional impairment<sup>[9]</sup>.

Although alternative muscles such as the rectus femoris, gracilis, and rectus abdominis can be mobilized, these required more extensive dissection and prolong the surgery. Over the past three years, we have consistently recommended the sartorius muscle transposition in five patients with groin sepsis from infected lymph fistulas, hospital-acquired groin infections, and complex lower limb injuries, without any instances of muscle flap necrosis<sup>[10,11]</sup>.

We strongly advise using this method to successfully prevent any potential groin wounds. Complete excision, thorough debridement, and subsequently extra-anatomical revascularization were the prescribed treatments for exposed grafts. These methods, however, raise the danger of limb amputation and death<sup>[12]</sup>.

Muscle flaps were used for covering, according to **Calligaro et al.**<sup>[6]</sup>, and this promoted faster wound healing and much less problems including infection, thrombosis and ruptured anastomosis. In the past, diseased vascular grafts were treated by being completely removed, debrided properly, and then bypassed extra-anatomically.

Death rates and major amputation rates were found to be 10-79% and 9-58%, respectively<sup>[6]</sup>. The graft can be saved with quick bacterial treatment, femoral vessel debridement, and flap covering<sup>[1, 13]</sup>. For the effective rescue of exposed infra-inguinal vascular bypass grafts. **Hosny**<sup>[14]</sup> advised early local muscle flap restoration in 2008.

Two patients in the current study were over the age of 60, and there were two (40%) female and three (60%) male patients. These outcomes were close to those described by **Landry et al.**<sup>[15]</sup>, who stated that the patients' mean age was 67.9 years and that the distribution of sexes was 50/50 (male/female).

Additionally, these outcomes closely resembled those reported by **May et al.**<sup>[9]</sup> in a study where most patients were over 60 years old. In our study, patients with exposed vascular grafts following vascular surgery included three (60%) who had undergone femoropopliteal bypass.

Similarly, our results were consistent with those of **Landry et al.**<sup>[15]</sup> who documented initial endarterectomy procedures in eight cases, aortofemoral

bypasses in six cases, femoral-distal bypasses in three cases, and axillofemoral bypasses in four cases.

**Limitations:** Despite the prospective nature of the current study, it had several limitations including a small single-center population and a short follow-up period. Additional multicenter trials with larger patient populations and extended follow-up periods are necessary to validate our findings.

## CONCLUSION

The application of sartorius muscle flaps by a vascular surgeon can facilitate the healing of infected groin wounds while maintaining graft patency and salvage. Ensuring that groin vessels are covered with a healthy muscle flap following vascular repair, particularly in the presence of an infected wound, is essential to prevent serious complications. Failure to do so can lead to life-threatening and limb-threatening issues. Our straightforward technique aimed to prevent such complications by preserving the blood supply to the muscle. We consistently used this method over many years in patients with infected groin wounds, achieving excellent results.

- **Financial support and sponsorship:** Nil.
- **Conflict of Interest:** Nil.

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