

Evaluation of Superomedial Fasciocutaneous Thigh Flap in Replacement of Scrotal and Penile Skin

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ABSTRACT:

BACKGROUND:

Skin loss of perinioscrotal region may result from severe infections, avulsion trauma or crush wounds. Replacement with sensible durable cover is mandatory for functional, cosmetic and psychological reasons. Wide range of flap techniques have been reported for these purposes.

OBJECTIVE:

To evaluate the use of superomedial fasciocutaneous thigh flap for replacement of scrotal and penile skin loss.

PATIENTS AND METHOD:

7 male patients aged between 25 and 69 years (mean=53.4) were included in this study. All of them presented, in the period between 2007-2010, with scrotal and penile skin loss. Four of them were with Fournier's gangrene, one was with history of agriculture accident, one with crush wound, and the last one was with penile skin loss after improper use of penile clamp. Superomedial fasciocutaneous thigh flaps were planned, elevated at subfascial plane, then transferred to close the wounds. Bilateral flaps were used in five patients for total scrotal reconstruction. All patients were followed for 3-13 months.

RESULTS:

12 flaps were used for the 7 patients with complete survival. These provided nice durable covers of the testes with good sensation. The flaps were moderately bulky in one patient. Other complications included serous fluid collection in one patient, wound dehiscence in two patients, paresthesia of the anterior aspect of thigh in 2 patient, and mild leg edema in one patient. All complications were transient and responded well to conservative treatment.

CONCLUSION:

Superomedial fasciocutaneous thigh flap is a good choice for scrotal and penile reconstruction that could provide a sensible, durable cover that fulfills patient satisfaction.

KEYWORDS: superomedial thigh flap, scrotal reconstruction, fasciocutaneous flaps

INTRODUCTION:

Scrotal, penile, and perineal skin loss may follow severe infections like Fournier's gangrene or it may be traumatic by crush injuries or avulsion by industrial or agriculture machines⁽¹⁾. Less than 50% of the scrotal skin loss can often be closed primarily without difficulties immediately after trauma, with the remaining surrounding tissue⁽²⁾. Extensive scrotal wounds with exposed testes represent challenging problems to the reconstructive surgeons. This is related to the fact that restoration of a durable functional cover of the testes and shape of scrotum is of paramount importance for physiological, social and psychological reasons, especially in young males³. A spectrum of surgical options have been used for closure of major scrotal wounds. These include

burying of testicles under the thigh skin⁴, expansion of the remaining scrotal and adjacent skin⁵, simple skin grafting^{6,7}, and various types of flaps like deep inferior epigastric^{2,8}, omental pedicle flap⁹, rectus abdominis muscle flap¹⁰. Thighs can also be a good donor site for many flaps like; gracilis muscle and myocutaneous flap^{11,12}, anterolateral thigh fasciocutaneous island flap¹³, unilateral adductor minimus myocutaneous flap¹⁴, anteromedial thigh flap¹⁵, superomedial thigh flaps¹⁶.

In this paper we present the use superomedial fasciocutaneous thigh flap for scrotal and penile skin loss.

PATIENTS AND METHOD:

7 male patients were included in this study (table.1). All of them were presented, to the plastic surgery department in Tikrit teaching

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hospital within the period between 2007-2010, with scrotal and penile skin loss asking for wound closure and reconstruction. Those with Fournier's gangrene(fig.1,a) were presented with well controlled general condition and infections, their wounds were clean and covered with healthy granulation tissue. The patient with agriculture accident has buried testes in thigh pouches and the wound was directly closed in the midline of perineum(fig.2,a), He was complaining from pain, tension and fullness sensation at sites of buried

testes, unacceptable appearance and decreased sexual function. The patient number 6 had necrosis of part of ventral skin and underlying urethra after improper use of urethral clamp. The clamp was used for bladder training as treatment for incontinence. The last patient had a history of crush wound of scrotum and perineum caused by car accident that result in partial loss of scrotal and perineal skin with exposure of left testis, direct closure of the wound was tried but not succeeded.

Table 1: Details of patients

No	Age	Site of skin loss	Cause	Reconstruction
1	47 years	Scrotum & penis	Fournier's gangrene	Bilateral thigh flap & skin graft for penis
2	69 years	Scrotum & penis	Fournier's gangrene	Bilateral thigh flap & skin graft for penis
3	60 years	Scrotum & penis	Fournier's gangrene	Bilateral thigh flap & penis
4	63years	Scrotum	Fournier's gangrene	Bilateral thigh flap
5	45 years	Scrotum	Agriculture(machine)accident	Bilateral thigh flap
6	65 years	Penis	Improper urethral clamping	Left thigh flap
7	25 Years	Scrotum &perineum	Crush wound	Left thigh flap

Surgical technique

With the patient under general anesthesia in supine position and the thighs slightly externally rotated. Superomedial fasciocutaneous thigh flap planned with base (9-11cm) below and parallel the inguinal ligament, the paddle(length 20-22cm) was directed inferomedially and its medial border just with the base of scrotum(fig.2,a). Incision made, around the three margins of the flap, through the skin, subcutaneous tissue, and deep fascia, then elevation of flap proceeded from distal to proximal in subfascial plane, reaching the base of the flap distal to the horizontal border of the femoral triangle(fig.2,b).

In cases of total scrotal reconstruction bilateral flaps were elevated and sutured over the exposed testicles with closure in two layers over corrugate drains(fig.1,b).

In patients number 5, the testicles were delivered from thigh pouches through the previous closure line, totally freed from surrounding tissues, then sutured together (fig.2,b) and covered by flaps(fig.3,c).

In the patient presented with skin loss of penis, full thickness skin graft was used for urethral reconstruction in the same procedure, then soft tissue loss was replaced by superomedial fasciocutaneous thigh flap elevated from the left side. The base was separated after 21 days.

Split- thickness skin graft was used to cover wounds over the penile shaft in(three of the four)patients with Fournier's gangrene.

In patient number 7, left superomedial fasciocutaneous flap was used to cover the exposed left testis and to replace partial perineal and scrotal skin loss.

The donor site of flaps were closed directly in eight flap donor sites, while split thickness skin graft for the other four.

Post operative care

The patients movements were restricted in his bed for one week. The drains were removed after 48 hours. Antibiotic cover was continued for 10 days and the stitches were removed after 10 days. The patients were followed for a period of 3-13 months.

RESULTS:

The age of our patients was between 25-69 years(mean=53.4). The causes of scrotal skin loss were Fournier's gangrene in four patients, agriculture machine accident in one patient, crush wound by car accident in one patients, while one patient got penile skin loss after improper use of penile clamp. All of the 12 flaps were survived completely, apart from marginal epidermal necrosis in two of them. The sensation was intact over the flap paddle from the first postoperative day.

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Complications of surgery are shown in (table.2) as wound dehiscence of about 2-3cm at the sites were the donor sites of flaps occurred in two patients in whom direct closure were done, serous fluid collection at the donor sites, in one patient, which was drained through small incision, transient

paresthesia over anterior part of thigh, moderate swelling of both legs. The flaps were thick and bulky in the early postoperative time, but then became more thin and pliable(fig.3). They remained bulky for three months in one patient only.

Table 2 :Complications

Complication	No. of patients
Partial wound dehiscence	2
Serous fluid collection at the donor sites	2
Paresthesia over anterior part of thighs	1
thick and bulky flaps	1

DISCUSSION:

Fournier's gangrene is a necrotizing infection, caused by mixed aerobic and anaerobic bacteria, and result in loss of skin and subcutaneous tissue in the perinioscrotal region. It is most common in patients with attenuated immune systems, diabetes mellitus, alcoholism, anorectal inflammatory diseases, urinary incontinence, and overall debilitated nutritional states. It requires an aggressive operative treatment to remove all necrotic tissue and achieve a bed suitable for coverage^(17,18). Post-traumatic scrotal and penile skin loss may follow an accident with industrial or agriculture machine belts^{19,20} or as crush wound following car accident⁽²¹⁾. Iatrogenic scrotal skin loss have been reported after excision of benign or malignant tumors⁽²¹⁾.

The number of our patients in this study is limited because we included only those who need reconstruction and excluded others without skin loss. Most of our patients were with Fournier's gangrene(4 of 7 patients).

Ashok M.B. et al, in a review of management of 110 patients with Fournier's gangrene, reported that bilateral orchidectomies were done for few patients then forbidden as they were unacceptable procedures especially for young males⁽²⁾. All of our patients preferred to have reconstruction rather than orchidectomies.

A wide variety of reconstructive procedures have been reported for coverage of exposed testes and replacement of penile skin loss. The method chosen must depend on patient's general condition, the severity of the injury itself, and the local

anatomic conditions (e.g., the extent of tissue defect, and viability of adjacent skin)⁽²²⁾.

Skin graft for exposed testes was first established by Balakrishanan C., as a two-stage procedure⁶. The main requirements are healthy granulation tissue and intact tunica vaginalis^(1,20). Although it has a good cosmetic result, it does not fulfill the patient satisfaction because of contractions, less mobility and poor protection of the underlying testicles^(13,20). Skin grafts were used for coverage of exposed parts of penile shaft only in three of our patients and it gave an acceptable results.

Wolach et al mobilized the testes to medial thigh pouches in 40% of his patients²³. This medial placement of the bare testes into the subcutaneous pouch of the thigh has a 96% success rate² and requires less surgical skill with less morbidity, but again not convincing option as there will be unsuitable environment for testicular function with possible atrophy, feminine appearance, pain, tension, and fullness sensations¹. Though, it may be a beneficial as a temporary stage for preservation of the testes and preparation for full scrotal reconstruction⁽²⁴⁾. Most of these limitations were present in the patient number (5) in this study and were solved by scrotal reconstruction with bilateral superomedial thigh flaps as shown in figure.2.

Flap coverage with a reliable vascularity, durability, functional expendability, and proximity to the perineum is clearly superior to the use of skin grafts or local flaps of limited dimensions under similar circumstances¹. We use the superomedial thigh fasciocutaneous flap because it

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is a sensate arterial flap. It was first reported by Hirshowitz et al. for repair of the scrotum and vulva⁽¹⁶⁾. It has an ample blood supply derived from three main sources: the deep external pudendal artery; the anterior branch of the obturator artery and the medial femoral circumflex artery. The subcutaneous branches of the superficial femoral artery, when present, are an additional source of arterial supply. The sensation is provided by branches from the ilioinguinal and genital branch of genitofemoral nerve^(18,25-28).

In this study we present the use of 12 superomedial fasciocutaneous thigh flaps for scrotal and penile reconstruction, 10 of them as bilateral flaps for total scrotal reconstruction, one for partial scrotal reconstruction and one for penile skin loss replacement. Scrotal reconstruction was done in single stage with simple planning and safe elevation and rotation flap technique that require moderate surgical skills. All flaps survived, apart from minor epidermal loss which were completely healed with conservative treatment. The flaps showed good sensation on the immediate postoperative day and also it was tested in the follow up period which was continued for 3-13 months. These advantages were comparable to that reported by Ferreira and et al, in there review of management of 43 patients with Fournier's gangrene⁽¹⁸⁾.

Yu .et al reported the use of the anterolateral thigh fasciocutaneous island flap for perinioscrotal reconstruction, based on septocutaneous or musculocutaneous perforators originated from the lateral circumflex femoral artery or its descending branch⁽¹³⁾. In comparison with the superomedial

flaps, it seems that the anterolateral flap technique needs more tedious dissection and has more variable vascular base.

The limited size of the superomedial thigh flap and its more horizontal direction mentioned by Abd El Majeed⁽²¹⁾, in his report of the anteromedial thigh flap for scrotal reconstruction, did not represent any technical problem in this study as bilateral flaps were used for total reconstruction (fig.1,c &2,c), in addition the use of single unilateral flap may result in deviation of the new scrotum to one side and yields nonsatisfactory appearance.

Sang W. L., and et al, have reported the use of Groin flap for penile skin loss replacement(with bilateral superomedial thigh flaps for total scrotal reconstruction) and mentioned that the increase in penis mass improved postoperative patient satisfaction⁽²⁹⁾. In this study unilateral superomedial thigh flap was used for partial penile shaft reconstruction to aid urethral reconstruction, it was found that it restore the lost penile mass.

Direct closures were done in 8 of 12 flaps donor sites (fig.1,c) with few transient complications, these represent an additional advantage of this technique.

Complications as small wound dehiscence, serous fluid collections, distal flap necrosis, paresthesia of the anterior surface of the thighs were transient and were managed conservatively, the bulkiness of the flaps and mild edema of lower extremities were the complaint of one patient and these resolved within three months without ill effect (fig.3). These minor complications were comparable to that presented with same⁽¹⁸⁾ and other flap techniques⁽²¹⁾.



(a)



(b)



(c)

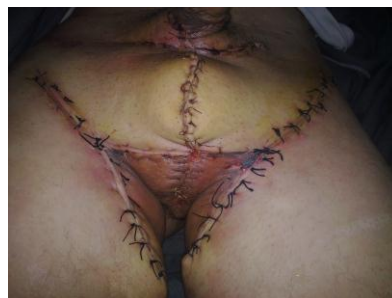
Figure.1: Scrotal reconstruction,(a) scrotal skin loss caused by Fournier's gangrene (b) reconstruction by bilateral superomedial thigh fasciocutaneous flap, immediate postoperative view. (c) one month after surgery



(a)



(b)



(c)

Figure.2 : Scrotal skin loss (a) the testes buried in thigh pouches. (b) the testes delivered and sutured together with the bilateral superomedial thigh fasciocutaneous flaps elevated. (c) one week postoperatively.



Figure 3: Total scrotal reconstruction by bilateral superomedial thigh fasciocutaneous flaps. One year postoperative view shows the scrotum covered with non bulky pliable skin and the closure of the donor sites.

CONCLUSION:

Superomedial fasciocutaneous thigh flap used for scrotal reconstruction; offers a sensible, durable, and protective cover for the exposed testes. The technique of flap elevation is simple, safe, and single stage procedure with possible direct closure of donor sites. The use of bilateral flaps for total scrotal reconstruction give an acceptable aesthetic results and facilitates closure of extensive defects. Superomedial thigh flap technique provides a good option for penile reconstruction, though it needs further evaluation.

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