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Outcome of Scrotal Reconstruction with Pudendal Thigh Flap in Fournier's Gangrene.

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Abstract
Introduction:
Fournier's gangrene is a common polymicrobial infection that require serial debridement and leaves complex scrotal defects after. Among the various reconstructive options, the pudendal thigh flap is a sensate, axial Fascio-cutaneous flap based on branches of the internal pudendal/perineal system that offers thin, stable, pliable cover with favourable texture match, potential protective sensation, and the ability to create a roomy, ptotic neo-scrotum in one stage.
Methodology:
Reported case series comprises 5 patients of Fournier's gangrene that required scrotal reconstruction post serial debridement. The patients underwent bilateral/ unilateral pudendal thigh flap based on the defect size. The operated patients include both diabetic and non-diabetic adults that were stable and consenting for the procedure after all complications, benefits and alternative options were explained. The outcome has been described in terms of the flap survival, donor site morbidity, aesthetics and testicular function.
Conclusion:
Reported case series is a retrospective study describing pudendal thigh flap as a reliable flap with minimal to no donor site morbidity, satisfactory aesthetics and testicular protection. Even in infected cases with methicillin resistant Staphylococcus aureus positivity, the outcome of the flap is excellent with appropriate elevation and pedicle marking intra-operatively. It is best suited for subtotal/ total scrotal defects with preserved perineal perforators, when thin, durable, sensate cover is desired and skin grafting is suboptimal.

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I. Introduction

Fournier's gangrene is a rapidly progressing necrotizing infection of the perineum and external genitalia that requires immediate resuscitation, administration of broad-spectrum antibiotics, and aggressive serial debridement (1). Extensive soft tissue loss frequently occurs, necessitating prompt reconstruction to restore testicular protection, thermoregulation, hygiene, and cosmesis. Although split-thickness skin grafting (STSG) is commonly employed for large defects, it is susceptible to shear, contracture, and inadequate thermoregulation or testicular protection in ambulatory patients. Flap-based reconstruction should provide stability, durability in contaminated fields, and a close match in thickness and pliability to the native scrotum. Several flap options have been described for scrotal reconstruction, including:

- Groin flap(2)
- Medial thigh flap(3)
- Gracilles flap(4)
- Anterolateral thigh flap(5)
- Pudendal thigh flap

Among these options, the pudendal thigh flap provides a sensate fascio-cutaneous flap based on branches of the internal pudendal vessels. This technique yields a thin, stable, and pliable coverage with favourable texture match and potential for protective sensation. It enables creation of a spacious, ptotic neo-scrotum in a single or two-stage procedure, with less donor site morbidity and no need for skin grafting.(6–8)

This retrospective case series includes five patients treated for Fournier's gangrene with exposed testicles between November 2023 and September 2025. In two cases with complete scrotal loss and exposed tunica albuginea, bilateral pudendal thigh flaps were used. Three cases with partial scrotal defects underwent unilateral flap reconstruction. A second-stage procedure for flap division and inset was performed in one case, while the remaining four cases underwent single-stage scrotal reconstruction.

Surgical Anatomy and Flap Design

The pudendal thigh flap, also called the Singapore or pudendal artery perforator flap, is supplied by terminal branches of the perineal artery, originating from the internal pudendal artery. Perforators emerge along the posteromedial thigh within the gluteal and inguino-perineal crease, accompanied by branches of the posterior scrotal (labial) nerves(9,10). The flap is typically designed over the hair bearing medial thigh, allowing inclusion of sensate branches to achieve protective sensation postoperatively. The arc of rotation (70–120°) readily reaches the scrotum and perineum while maintaining a short, reliable pedicle.

Indications and Contraindications

Indications: Subtotal or total scrotal loss after Fournier's gangrene with exposed testis.

Contraindications/relative contraindications: Unreliable perineal perforators after previous radical debridement, prior radiation or vessel depleting trauma, poor local bed requiring further debridement; inability to position the patient for safe harvest, patients with urinary and/or faecal incontinence due to the risk of constant soiling of the perineum, and unstable patients.

INCLUSION CRITERIA:

- Partial or complete scrotal loss with exposed testis requiring reconstruction
- Both diabetic and non-diabetic patients
- Age group: 15-65

EXCLUSION CRITERIA:

- Scar in groin
- Unstable patients unfit for surgery
- Patients below 15 and above 65 years of age

PRE-OPERATIVE PLANNING:

- Routine pre-operative blood investigations, ECG, 2D-echo, chest X-ray
- Culture sensitivity
- Pre-anaesthetic evaluation
- Preparation of scrotum, perineum and groin by scrubbing the area with 7.5% betadine scrub 2-3 days prior to surgery. At the time of surgery, topical antibiotic wash according to culture sensitivity followed by betadine wash and saline wash.
- Pre-operative marking of perforators and the pedicle with handheld Doppler

Stepwise Operative Technique:

1) Template and markings: With the patient in lithotomy or frog-leg position, template the defect. Mark a skin paddle along the inguino-perineal and gluteal crease on the posteromedial thigh (typically 6*12 cm to 6.5*15 cm in all 5 cases depending upon the defect size)
2) Intra-operative pedicle marking done with handheld doppler and significant vessels were identified and traced, and flap markings were done.
3) Incision was made to raise the flap was along with the deep fascia of thigh/groin, without exposing the femoral vessels.
4) Flap elevation was done in the subfascial plane along the markings without damaging the pedicle and preserving the peroneal artery perforators and scrotal (labial) nerves. As the patients were of thin built, no defatting/debulking of the flap was done.
5) The flap was then rotated such that no compression was present over the base of the flap and it was then sutured to the scrotal defect in partial scrotal defect in the unilateral reconstruction. In bilateral reconstruction, flaps from both sides were rotated to cover the testis and both flaps were sutured. Partial inset of the flap was given to the scrotum.
6) Donor site of the flaps were sutured primarily in layers after achieving perfect haemostasis.
7) No drain was placed during the procedure. Foley's catheter was placed to avoid spillage for the first two days.

POST-OPERATIVE MANAGEMENT:

- IV antibiotics as per culture sensitivity were administered for 5-7 days followed by the same oral antibiotics for 1 week.
- Regular, non-compressive, closed dressings for 1 week and flap monitoring.
- Scrotal support with scrotal dressing.
- Complete immobilization for 48 hours, followed by partial immobilization for 2-3 weeks.
- After 48 hours, Foley's catheter was removed as the patient was mobilised for basic needs.
- Suture removal after 2-3 weeks for the flap and 2 weeks for donor site of flap.
- Strict glycaemic control in diabetic patients
- Toilet training and perineal care
- Planning of second stage procedure in 1 case after 2 months.
- As none of the patients that we operated on had any penile skin loss prompting reconstruction of the same, they were allowed to resume regular sexual life after complete healing of the wound.

II. Results:

Patient	Age	Aetiology	Defect Type	Flap Type	Diabetic status	Outcome	Complications
1	52	Fournier's gangrene	Total	Bilateral	Diabetic	Stable skin with scrotal support with preserved sensations.	None
2	45	Fournier's gangrene	Total	Bilateral	Diabetic	Good with preserved sensations.	None
3	51	Fournier's gangrene	Partial	Unilateral (R)	Diabetic	Good	None
4	57	Fournier's gangrene	Partial	Unilateral (L)	Diabetic	Good	None
5	43	Fournier's gangrene	Partial	Unilateral (L)	Non-diabetic, MRSA Positive	Good	Partial tip necrosis due to venous congestion

Images:

Image 1- Bilateral exposed testis before debridement

Image 2- Exposed testis after debridement

Image 3- Flap markings- bilateral pudendal thigh flap

Image 4- Flap elevated on the left side

Image 5- Bilateral flap elevation done

Image 6- Bilateral flap inset given, donor site sutured primarily

Image 7- Follow up at 1 month (flap survival assessment)

Image 8- Bilateral flap follow-up at 1 year (aesthetic assessment)

Image 9- Scrotal defect for unilateral flap

Image 10- Unilateral flap marking done intra-operatively

Image 11- Unilateral flap elevated

Image 12- Unilateral flap inset given to the recipient site

Image 13- Unilateral flap- 3-month follow-up

Complications and Risk Mitigation

Potential complications include partial tip necrosis, venous congestion, wound dehiscence, seroma or hematoma, infection, bulky contour, and sensory dysesthesia, though these are infrequent with meticulous pedicle management. In this series, partial tip necrosis of less than 1 cm occurred in one case, likely due to venous congestion. Management included intravenous fluids and scrotal support, with debridement of necrotic tissue and secondary intention healing.

Donor site issues include tightness or hypertrophic scarring along the inguinal crease. None of these were noted in our case series.

Practical Decision Algorithm

As the number of cases of Fournier's gangrene with infection in both diabetics and non-diabetics (caused by trauma) with both partial and total defects of scrotum, with total skin loss, we chose Pudendal thigh flap, which is a best possible option for scrotal reconstruction in terms of providing stable, sensate skin, preventing testicular trauma, with less donor site complications like: visible scarring and necessity of skin grafting (11).

III. Discussion

Pudendal thigh flap uniquely balances simplicity, vascular reliability, similar texture, and potential sensibility(6). Compared with split thickness skin grafting, pudendal thigh flap reduces graft shear and contracture around mobile perineal interfaces and better shields the testes. Compared with anterolateral thigh or gracilis (12), it avoids bulk and secondary debulking. Bilobed variants extend reach and surface area while maintaining thinness. Selection hinges on perforator integrity after debridement and patient factors (diabetes, obesity, ambulation, hygiene). Prospective studies comparing pudendal thigh flap to split thickness skin grafting and anterolateral thigh flap with standardized patient-reported outcomes and objective thermoregulation metrics remain needed. (13)

IV. Conclusion

In Fournier's gangrene with subtotal/total scrotal loss, the pudendal thigh flap is a reliable, one stage option that reproduces the native scrotum's thin, pliable, and sensate characteristics with no need of skin grafting for donor site.

When carefully indicated and executed, it achieves durable coverage with low morbidity, serving as a reliable cover to preserve testicular function and protect testes from trauma. It should be a part of every reconstructive algorithm for Fournier's gangrene once the wound is clean and perforator integrity is confirmed.

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