

Perineal Reconstruction with Thick Split-Thickness Skin Grafts following Fournier's Gangrene and Traumatic Perineal Degloving Injury: A Case Report

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Abstract

Background: Perineal reconstruction following extensive soft tissue loss presents a formidable surgical challenge, particularly in resource-limited settings where advanced reconstructive options may not be readily available. Both Fournier's gangrene and traumatic degloving injuries can leave large perineal defects that demand reliable, cost-effective, and technically accessible solutions. **Case Presentation:** The authors report two adult male patients managed at two major referral centres in Ghana. The first was a 67-year-old hypertensive farmer who presented with circumferential penile and scrotal wounds secondary to Fournier's gangrene. After serial debridement and wound optimisation, we reconstructed the penile shaft with a thick split-thickness skin graft (TSTSG), while the scrotal defect was closed primarily, with 100% graft take on post-operative day 10 and satisfactory functional recovery at eight weeks. The second was a 28-year-old farmer who sustained a complete perineal degloving injury in a road traffic accident. After three weeks of wound bed preparation, the scrotum was reconstructed with bilateral random cutaneous thigh flaps and the penile shaft with a TSTSG, with full wound healing at three months and preserved penile sensation and erectile function. **Conclusion:** Thick split-thickness skin grafting, used alone or in combination with local flaps, is a practical, reliable, and reproducible reconstructive strategy for complex perineal defects in low-resource settings. These cases support its broader adoption as a first-line option when free flaps or specialised tissue-engineering

modalities are unavailable.

Keywords

Autologous Skin Grafts, Fournier's Gangrene, Perineal Reconstruction, Split-Thickness Skin Graft, Traumatic Degloving

1. Introduction

The perineum is a structurally complex region, and soft tissue loss in this area, whether from infection or trauma, poses reconstructive challenges that go well beyond those encountered elsewhere on the body surface. The region's proximity to the urogenital and anorectal openings, its constant exposure to moisture and microbial contamination, and the inherent mobility of the scrotum and penile skin all conspire against straightforward wound closure and graft survival.

Among the infectious causes, Fournier's gangrene remains the most feared. It is a rapidly progressive, polymicrobial necrotising fasciitis of the perineum and genital region, driven by synergistic bacteria that produce obliterative endarteritis and extensive tissue necrosis. Mortality in published series ranges from 3% to over 40%, depending on the extent of disease, comorbidities, and time to surgical intervention [1]-[3]. Survival, however, is only the beginning: the debridement required to control the infection routinely leaves wounds too large and contaminated for primary repair, necessitating a planned reconstructive phase.

Traumatic perineal injuries, though less common in civilian practice, arise most frequently from road traffic accidents and straddle mechanisms. Complete or near-complete degloving of the penis and scrotum is a recognised but uncommon consequence of high-energy perineal trauma [4]-[6]. These injuries demand early debridement, urinary diversion, and a staged reconstructive approach timed to wound bed maturity rather than urgency of coverage. Reconstructive management options for large perineal defects span a broad spectrum—from split-thickness skin grafting (STSG) and local perforator-based flaps, to free tissue transfer and, more recently, tissue-engineered constructs [2] [3] [7] [8]. In high-income settings, pedicled or free flaps offer the theoretical advantage of importing vascularised tissue into a compromised field. In practice, however, such techniques require advanced infrastructure, longer operative times, and technical expertise that cannot be assumed in most sub-Saharan African hospitals. Against this backdrop, autologous STSG, an operation requiring only a dermatome or hand-held skin-graft knife, a well-granulated wound bed, and basic perioperative nursing, represents a compelling and underreported option in this geography. Published data on perineal reconstruction specifically from Ghana and sub-Saharan Africa remain scarce. We present two adult male patients managed at two different referral centres in Ghana, who underwent perineal reconstruction with TSTSG following Fournier's gangrene and traumatic perineal degloving injury, respectively. We de-

scribe the surgical decision-making for each case, the outcomes achieved, and the lessons that may be generalisable to similar resource-limited settings.

2. Case Presentations

2.1. Case One: Fournier's Gangrene in a 67-Year-Old Male Farmer

A 67-year-old male farmer with known but previously well-controlled hypertension presented to the Accident and Emergency Directorate of Komfo Anokye Teaching Hospital with a one-month history of progressive circumferential ulceration of the penis and scrotum. He described an initial swelling and redness of the scrotum that had gradually broken down, with associated pain, malodour, and fever. There was no antecedent urological procedure, no history of perineal trauma, and no known history of diabetes mellitus or immunosuppression. He had not sought care earlier due to financial constraints and distance from a health facility. On examination, he was afebrile, not pale, and well hydrated. Local examination revealed a well-demarcated circumferential ulcer extending from the mid-scrotal skin to approximately 2 cm distal to the corona of the penis, with complete loss of penile shaft and scrotal skin. The floor was a mixture of granulating tissue and slough with a sloping edge and soft base. The underlying testes were intact and within the confines of viable dartos tissue. There was no crepitus, no extension to the perineum or anterior abdominal wall, and no palpable inguinal lymphadenopathy. The glans penis was spared. The diagnosis of Fournier's gangrene was made clinically, based on scrotal swelling, redness, pain, fever, malodour and areas of necrotic skin, supported intraoperatively by the extensive necrotic skin, subcutaneous and fascial tissues of the scrotum and penis. He was admitted to the Urology team and commenced on empiric broad-spectrum intravenous antibiotics (ceftriaxone and clindamycin) immediately by the emergency team on duty in line with the treating team's protocol. Wound culture was not obtained during the initial debridement because of the patient's financial difficulty. Haematology and biochemistry laboratory investigations were unremarkable. The patient had 3 serial surgical debridements alternated with chemical debridement using povidone-iodine and Vaseline gauze dressing over approximately 3 weeks. The initial debridement involved excision of scrotal and circumferential penile shaft necrotic skin up to the corona. Subsequent debridements involved slough removal from the penile shaft and scrotum. Debridement was continued until the wound had a clinically healthy wound bed. An internal consult was sent to the Plastic Surgery team when the wound was well granulated for reconstruction. On Plastic Surgery assessment, the wound bed was well granulated, moist, devoid of discharge and slough and deemed ready for grafting as shown in **Figure 1(a)**. Under spinal anaesthesia, a 0.45 mm TSTSG measuring approximately 5 cm × 15 cm was harvested from the left lateral thigh using an electric dermatome. The graft was unmeshed and secured to the wound bed on the penile shaft using vicryl 4-0 via interrupted stitches while the scrotal defect was closed primarily after release of the retracted skin with nylon 2-0 as depicted in **Figure 1(b)**. A Vaseline gauze

dressing was applied, and the graft was left undisturbed for 10 days before the first dressing. A thick dressing with gauze wrapped with a crepe bandage was used to splint the penile shaft, and the urine was diverted with a urethral catheter in-situ to aid with graft protection and take. The donor site was regrafted with the excess skin graft harvested and dressed with Vaseline gauze. At the first wound inspection on post-operative day 10, graft take was 100% across the entire recipient site as seen in **Figure 1(c)**. The urethral catheter was removed, and the patient was confirmed to void normally. He was discharged and followed up on an outpatient basis over eight weeks. At final clinic review, the grafted penile shaft and the scrotum had healed completely, with good pliability of the graft, preserved penile sensation, normal spontaneous erections, and normal urinary flow as illustrated in **Figure 1(d)**. Scar maturation was ongoing, and he was advised to continue gentle moisturisation with petroleum jelly. The donor site had healed with a flat, hypopigmented scar acceptable to the patient. No complications such as infection, graft loss, or donor site breakdown were noted during the follow-up period.



Figure 1. Case 1—Fournier's gangrene. (a) Intraoperative photograph showing the well-granulated circumferential penile shaft and scrotal defect following serial debridement; (b) Intraoperative view of the thick split-thickness skin graft applied to the recipient site; (c) Post-operative appearance at day 10, demonstrating 100% graft take; (d) Follow-up at eight weeks, showing complete healing with pliable graft and no contracture.

2.2. Case Two: Traumatic Perineal Degloving in a 28-Year-Old Male Farmer

A 28-year-old male farmer with no known history of chronic illnesses presented two hours after sustaining a high-energy straddle injury. He had been thrown from the edge of a tricycle cargo bucket onto the chassis of the tricycle, landing astride on the metallic frame. He was rushed to the regional hospital where he was stabilised, and hemostasis was achieved. Perineal examination revealed a complete degloving of the penile shaft and scrotum, with both testes exposed but viable within an intact tunica vaginalis; the glans penis and its skin were spared, as shown in **Figure 2(a)**. In addition, there was a deep longitudinal laceration about 8 cm in length in the central perineum, superior to the anal margin. The urethra was assessed clinically during the initial evaluation, and a urethral catheter was passed without difficulty. No clinical evidence of urethral injury was identified. However, no formal urethrographic or endoscopic assessment was performed; therefore, occult urethral injury could not be definitively excluded. Also, rectal integrity was assessed by digital rectal exam, and pelvic injury was evaluated by clinical exam of pelvic stability. No pelvic imaging was performed as there was no clinical suspicion of pelvic trauma. Anti-tetanus serum, tetanus toxoid, analgesics,



Figure 2. Case 2—Traumatic degloving. (a) Pre-operative photograph demonstrating complete perineal degloving with bilateral testicular exposure; (b) Intraoperative photograph of the wound at three weeks following daily Vaseline gauze dressings, with healthy granulation tissue covering the penile shaft; (c) Intraoperative photograph showing bilateral random thigh flap elevation for scrotal reconstruction and the harvested thick STSG for the penile shaft; (d) Three-month follow-up demonstrating a fully healed neoscrotum and penile shaft skin.

and intravenous antibiotics were administered. Baseline laboratory investigations were unremarkable. Under spinal anaesthesia, thorough wound debridement was performed. Given the extent of contamination and the absence of viable skin for primary closure, the decision was made to adopt a staged approach. The patient underwent 5 surgical debridements involving the penile shaft up to the corona and wound dressings with Vaseline gauze was done every 48 hours over 3 weeks period. Both testes and the edges of the longitudinal laceration in the central perineum were covered with healthy granulation as depicted in **Figure 2(b)**. Reconstruction was performed under spinal anaesthesia in a single operative session. Three techniques were employed; each matched to the characteristics of the wound subsite. For the scrotum, a bilateral random-pattern cutaneous rotational flap was raised from the medial aspect of both inner thighs measuring approximately 10 cm × 20 cm taking into accounts the ease of primary closure of the defect. The flap was rotated approximately 60 degrees each medially to achieve coverage of both testes, a choice made deliberately to import well-vascularised, hair-bearing skin and to recreate a mobile, thermoregulatory pouch for the testes as illustrated in **Figure 2(c)**. The flap was secured to the wound margins using nylon 3-0 in a simple interrupted suturing pattern. For the penile shaft, a 0.45 mm TSTSG skin graft measuring approximately 7 cm × 20 cm was harvested from the lateral aspect of the right thigh and applied circumferentially as demonstrated in **Figure 2(c)**; the non-hair-bearing character of this graft site was chosen to avoid hair growth on the penile shaft. The graft was unmeshed and secured to the wound bed using vicryl 4-0 interrupted stitches. A Vaseline gauze dressing was applied, and the graft was left undisturbed for 7 days before the first dressing change. Thereafter, dressings were changed every other day using saline, Vaseline gauze and a crepe bandage whilst the wound was monitored for graft viability, infection and necrosis. The longitudinal perineal laceration was closed primarily with 2-0 nylon. The donor site was dressed with Vaseline gauze. All three components of the repair were performed without complications. Post-operatively, the patient received analgesics, antibiotics, verbal instructions on manual penile movement restrictions and was kept with the urethral catheter in situ for 2 weeks to minimise shear at the graft site. He was reviewed weekly on an outpatient basis following discharge. At the three-month post-operative review, all three operative sites had healed completely as shown in **Figure 2(d)**. Penile sensation was intact to light touch, and the patient reported the ability to sustain spontaneous erections satisfactory for sexual intercourse. The neoscrotum was soft and mobile, with both testes palpable in normal position. The perineal suture line was well healed. The donor thigh site showed a healing hypopigmented scar without contracture or breakdown. He was counselled on long-term scar modulation with Vaseline cream.

3. Discussion

The two cases presented here share a broad reconstructive problem, large perineal soft tissue defects in adult men, but differ in aetiology, age, acuity, and the specific

anatomical zones affected. Together they illustrate a practical reconstructive algorithm suited to busy referral centres in a low-resource setting, where operative versatility and reliable graft survival matter as much as technical ability (**Table 1**).

Table 1. Summary of clinical and operative outcomes.

Parameter	Case 1 (Fournier's Gangrene)	Case 2 (Traumatic Degloving)
Age (years)	67	28
Aetiology	Fournier's gangrene	Straddle/degloving RTA
Defect Location	Scrotum and penile shaft	Perineum, scrotum and penile shaft
Time to reconstruction	3 weeks post-admission	3 weeks post-injury
Reconstructive technique	Thick STSG: penile shaft and primary closure of the scrotum	Bilateral cutaneous thigh flaps (scrotum) + Thick STSG (penile shaft) + primary closure (perineal laceration)
Graft/flap take	100% at day 10	Complete healing at 3 months
Donor site morbidity	Well-healed, hypopigmented scar	Well-healed, no contracture
Functional outcome	Normal voiding, erection, sensation	Normal erection, sensation, scrotal mobility
Complications	None	None
Follow-up duration	8 weeks	3 months

3.1. Choice of TSTSG for the Penile Shaft

Split-thickness skin grafting of the penis is well described in the literature, both for post-infectious defects [2] [3] [9] and traumatic degloving [5] [6] [8]. The decision to use a 'thick' STSG, generally defined as 0.35 - 0.45 mm rather than a thin graft, was deliberate. Thicker grafts contain a greater proportion of dermis and, once healed, contract less, are more durable, and retain more of the donor site's tactile sensory receptor density. For penile shaft reconstruction, where secondary contraction can produce a buried or tethered penis and impair erectile function, this is not a trivial consideration. The trade-off of slightly less reliable initial take than a thin graft, and a donor site that heals more slowly, was judged acceptable in both patients given the well-prepared wound beds at the time of grafting. Both patients had granulation tissue confirmed as the substrate before grafting. This is consistent with the general principle that STSG on granulation tissue in perineal defects yields acceptable take rates provided the wound is free of frank infection, the granulations are non-sloughy, and haemostasis is meticulous at the time of graft application [2] [7]. The 100% take achieved in Case 1 at day 10 compares favourably with published series of Fournier's gangrene reconstruction, where mean graft take rates range from 85% to 100% depending on wound preparation protocol and postoperative immobilisation [2] [9].

3.2. Rationale for Flap Reconstruction of the Scrotum in Case 2

The divergence in technique between the two cases warrants explanation. In Case 1, residual dartos tissue was present within the wound bed, providing a degree of

native vascularity and a substrate amenable to grafting. In Case 2, complete degloving left the testes entirely exposed within an avascular field, and there was no residual scrotal tissue. Here, applying an STSG directly over the tunica vaginalis carries a real risk of poor take, desiccation of the testicular covering, and long-term discomfort during thermoregulatory shrinkage of the testes. The scrotum's function as a thermoregulatory organ, maintaining testicular temperature 2°C - 3°C below core body temperature through the combined action of the dartos and cremaster muscles, is best preserved by importing pliable, well-vascularised, contractile skin [8] [10]. The bilateral medial thigh advancement flaps in Case 2 achieved this: they brought in sensate, hair-bearing skin with a random vascular pattern, recreated a dependent pouch, and by maintaining bilateral testicular coverage preserved spermatogenic conditions. The penile shaft, by contrast, required non-hair-bearing skin with low contraction potential, and here the contralateral thick STSG was the appropriate choice.

3.3. Outcomes against Published Series

Insua-Pereira *et al.*, in a review of reconstructive options following Fournier's gangrene [3], reported that STSG remains the most widely used technique globally, employed in over 60% of reconstruction cases in published series, with local flaps and free flaps reserved for defects involving the perineum proper or where graft survival on the wound bed is deemed unreliable. For traumatic perineal degloving, Bhattarai *et al.* [5] and Alkahtani *et al.* [6] each described cases managed with STSG and local flap combinations, noting that the key determinant of functional outcome was not technique selection per se but wound bed quality at the time of reconstruction and surgeon familiarity with the approach. Schifano *et al.*'s systematic review of scrotal reconstructive surgery [8] noted that bilateral thigh flaps are the most commonly reported technique for total scrotal avulsion and are associated with consistently good functional and cosmetic outcomes. Our Case 2 aligns with this evidence base.

3.4. Implications for Resource-Limited Settings

Together, these two cases show that high-standard perineal reconstruction is achievable within the constraints of public referral centres in sub-Saharan Africa. Neither free flaps nor dermal substitutes were required. The techniques used, TSTSG and random local flaps, demand no special equipment beyond a dermatome or Humby knife, a functioning theatre, and consistent nursing care of the wound bed in the weeks before reconstruction. The relatively long wound preparation periods may appear extended by the standards of centres with access to negative-pressure wound therapy. Still, they are both clinically appropriate and resource-rational in this setting: daily or alternate-day dressings by skilled nurses, combined with systemic antibiotics targeted to wound cultures, achieved the wound bed maturity needed for definitive grafting.

Functional recovery in both patients with achievement of penile sensation and

erectile function makes TSTSG an alternative for perineal reconstruction in combination with other surgical procedures. These outcomes were achieved without genital prosthetics, nerve repair, or vascular anastomosis, and without the prolonged hospitalisation that free-flap reconstruction typically entails.

4. Limitations

Several limitations of this report should be acknowledged. First, with only two cases, we cannot define a formal protocol. Second, functional outcomes were assessed clinically rather than with validated instruments; neither the International Index of Erectile Function nor a validated sensory assessment tool was applied, which limits comparability with other published series.

5. Conclusion

Perineal reconstruction following Fournier's gangrene and traumatic perineal degloving injury can be accomplished reliably with thick autologous split-thickness skin grafts, used alone for penile shaft reconstruction and in combination with local random thigh flaps for perineal injuries with exposed testes. In both cases presented, satisfactory wound healing, preserved genital function, and acceptable donor site outcomes were achieved without dependence on free tissue transfer or advanced wound care technology. These results support the broader adoption of thick STSG as a primary reconstructive tool for perineal defects in major referral centres in Ghana, where its simplicity, reproducibility, and low cost-to-outcome ratio make it particularly well-suited to the clinical environment.

Patient Consent

Written informed consent was obtained from both patients for publication of this case report, including clinical details and intraoperative and postoperative photographs. Personal identifiers have been removed from the manuscript text. The signed consent documents are available on request.

Ethics Statement

Formal ethics committee approval is not required for case reports at our institution per institutional policy. The cases were managed in accordance with the Declaration of Helsinki.

Author Contributions

EKT and FQ: data collection, surgical management, manuscript drafting, and critical revision. PAB, POMM and PFT: manuscript drafting, critical revision, and final approval. All authors reviewed and approved the final version submitted for publication.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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