Case Series

Simple reconstruction of the skin and soft-tissue defect following Fournier's gangrene

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ABSTRACT

Fournier's gangrene (FG) is a form of severe necrotizing fasciitis over the external genitalia, perineal, and perianal region with vessel thrombosis, sepsis, and multiorgan failure. Mortality and morbidity are high, treatment includes intensive resuscitation, emergency debridement, and parenteral antibiotics. The defects are closed later using negative pressure, skin grafting, muscle flaps, primary closure, thigh pockets, or a combination. The below case series included four patients who presented with FG involving the perineum and external genitalia, underwent serial debridement of the necrotic scrotal tissue exposing the testes, and once the wound was clean, a local cover for the testes either primary closure by mobilization of healthy skin around the scrotum, or by medial thigh pockets was done. The advantages of utilizing the local skin are reduced friction, good cosmesis, decreased infection, ensured functionality, easier to perform surgically, have reduced hospital stay; as compared to grafting, which leads to contractures with healing, decreased lubrication, and higher patient dissatisfaction. Utilizing the local skin around the scrotum and perineum can act as an efficient means of satisfactory restorative cosmesis and function in FG.

Key words: Cosmesis, Fournier's Gangrene, Primary closure, Scrotal skin, Simple reconstruction

Fournier's gangrene (FG), an overwhelming necrotizing fasciitis, involves the external genitalia, perineal region with thrombosis, obliterative end-arteritis, sepsis, and multiorgan failure [1,2]. The disease is more common among men in the 5–6th decade [1,3]. The infection arises from the urogenital tract and anorectum and is prevalent among individuals with uncontrolled diabetes, malignancy, immunocompromise, malnutrition, peripheral artery disease, alcoholism, and obesity [2,3]. A cytokine cascade is initiated by bacteria that damage the endothelium, causing thrombosis, and disseminating into regional vessels, resulting in ischemic necrosis of tissues, with rapid advancement along fascial lines (scrotum, perineum, abdominal wall, and thigh) [1]. Diagnosis is clinical and scoring with the Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC), FG severity index (FGSI), and body surface area scores predict prognosis [1,3-5]. Diagnostic ultrasound and computed tomography depict air or foreign body in deep tissues, testes vascularity, thickness of the scrotal wall, and collection, which can diagnose FG, and rule out other causes [1,2,5]. Mortality and morbidity rates are high (0–67%), especially in delayed presentation and diagnosis [2,3,5]. Treatment includes inpatient intensive care, resuscitation, emergency debridement, and parenteral large-spectrum antibiotics. The post-surgical defect can be approximated with negative pressure wound therapy, skin grafting, flaps, simple primary closure, medial thigh pockets, or a combination of the above [2,6,7].

Since perineal skin is known for its vascularity, plasticity, and thermoprotection, it is considered the best agent to cover defects created in surgery for FG as it provides aesthetic cosmesis, decreased contractures, and regulates functionality, when compared to other methods.

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CASE SERIES

Four patients referred to as patients 1, 2, 3, and 4 were considered after written informed consent and Institutional Ethical Committee clearance. The patients were admitted in Feb–March 2020 at the Government Hospital in Mangalore.

Case 1

A 25-year-old male, presented with nil comorbid status, scrotal swelling, perineal discharge, discoloration of the skin around the genitalia for 5 days, and fever for 3 days along with a history of

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debridement 2 days prior at another hospital. Vital signs and systemic examination were normal. Bilateral testis were exposed, scrotal skin was absent, and purulent discharge was noted, along with an underlying ulcer extending to the perianal area, with positive signs of inflammation. Digital rectal examination (DRE) was normal. Blood investigations noted raised C-reactive protein (CRP) and total white cell counts (TLC). The LRINEC score was 2.

He was started on IV Amoxicillin-Clavulanic acid, Gentamycin, and Clindamycin, which was changed to Meropenem, Metronidazole, with a wound swab culture growing *Escherichia coli.* The patient underwent repeat debridement (Fig. 1). Intraoperatively, necrosed areas were debrided and the wound was thoroughly irrigated. When the operative site showed signs of adequate healing and granulation tissue, a simple primary closure was attempted after mobilizing healthy skin around the exposed testes and perineal area (Fig. 1). The post-operative stay was uneventful. He was discharged on post-operative day 3, with advice to review in 2 weeks for suture removal. However, due to the COVID-19 pandemic, he was reviewed at the outpatient clinic 5 months later, with a well-healed surgical site, excellent approximation, and maintained testicular functions (Fig. 1).

Case 2

A 51-year-old male, smoker, known diabetic on insulin, and hypertensive complained of scrotal swelling, blackish discoloration around the scrotum, discharge from the perineum for 1 week, and fever for 3 days. The patient was having a history of stroke 10 years ago and was treated for pulmonary tuberculosis 15 years ago. Vital signs were stable and general examination showed power of 4/5 in the right upper and lower limbs. The rest of the examination was normal. Bilateral testes were exposed showing the necrosed scrotal skin. Purulent discharge was noted, along with an ulcer on the right ischial area with positive signs of inflammation. DRE was normal. Laboratory parameters showed raised CRP, HbA1c, TLC, and mildly low hemoglobin. The LRINEC score was 6.

Emergency debridement was done where necrosed tissue was excised, the testis was exposed, and the wound was thoroughly irrigated. He was started on IV Amoxicillin-Clavulanic Acid and Clindamycin, which was changed to Cefaperazone-Sulbactam. Metronidazole after wound swab culture was showing pan-resistant *E. coli*. Simple primary closure with mobilization of remnant healthy skin around the scrotum and penis was done, along with debridement of the right ischial ulcer and secondary suturing was done once the wound was well granulated (Fig. 2). The hospital stay was uneventful. On post-operative day 4, he was discharged with advice to review in 2 weeks. Due to the COVID-19 pandemic, he was lost to follow-up. A telephonic review revealed that the patient had expired due to COVID-19 about 1 month after discharge.

Case 3

A 52-year-old male, smoker, known diabetic, hypertensive, presented with complaints of scrotal swelling and discoloration with perineal discharge for 5 days. Vital signs and general examination were normal. There was generalized swelling of the scrotum, along with blackish discoloration, discharge, and positive signs of inflammation. DRE was normal. Ultrasound revealed diffuse scrotal wall thickening of 5 cm with preserved vascularity of the testes. Laboratory parameters showed raised CRP, HbA1c, and TLC with low hemoglobin. The LRINEC score was 5.

He was taken up emergency debridement (Fig. 3) and started on IV Piperacillin-Tazobactam and Metronidazole which was found sensitive to Cefaperazone-Sulbactam for *Klebsiella* species once the wound swab culture was reported. When the surgical site showed signs of healing with healthy granulation tissue, mobilization of the skin of the medial thigh to create subcutaneous pouches for the testes was done (Fig. 3). On post-operative day 3, the patient was discharged with advice to review. However, he was lost to follow-up. A telephonic review revealed no complaints with good wound healing and functionality.

Case 4

A 55-year-old male, smoker, known diabetic on insulin, hypertensive, presented with complaints of scrotal swelling, pain, and discoloration

Figure 1: Patient 1, taken preoperatively, after primary closure, and at 5-month follow-up (clockwise)

Figure 2: Patient 2, taken after the initial debridement

Figure 3: Patient 3, taken after the initial debridement (left side) and taken after medial thigh pouches created (right side)

Figure 4: Patient 4, taken preoperatively (left side), and after initial debridement (right side)

for 5 days and fever of 2 days duration. Vital signs and general examination were normal. There was an enlarged discolored scrotal swelling seen, along with positive signs of inflammation and the testes were not felt separately. DRE was normal (Fig. 4). Ultrasound revealed extensive scrotal wall thickening of 4 cm with preserved vascularity of the testes. Blood values noted raised CRP, HbA1c, and TLC. The LRINEC score was 9.

Emergency debridement was done (Fig. 4), IV Amoxicillin-Clavulanic acid, Gentamycin, and Clindamycin, commenced, then changed to sensitive Piperacillin-Tazobactam, Metronidazole as wound swab culture grew *E. coli*. Simple primary closure without tension was done after mobilizing skin around the perineum. The patient was detected to be positive for COVID-19 on post-operative day 3 and eventually, the patient expired from pneumonia during the same hospital stay.

DISCUSSION

FG, a necrotizing fasciitis, can present in both genders. Individuals aged 30–60 years of age and suffering from an underlying disease such as diabetes, immune suppression, malignancy, liver, and renal disease are more prone to risk [1-3].

Presentation can vary from 1 to 30 days before care [3], and may be 1 month before treatment [7]. FG has high morbidity and mortality, with sepsis <40%, despite advancements in medical therapies [2-4,6,7]. Infection from the urogenital (20–40%), gastrointestinal (30–50%), traumatic cutaneous (20%) *Staphylococcus aureus, Streptococcus* spp., *Klebsiella* spp., *E. coli,* with polymicrobial – obligate anaerobic bacteria occurs [3,4,7]. There is a strong recommendation to administer triple therapy with Piperacillin-Tazobactam, Carbapenems, Linezolid, Tigecycline, with Clindamycin, and an aminoglycoside and Metronidazole [4,7].

Differential diagnoses noted were cellulitis, orchitis, acute epididymitis, scrotal abscess, streptococcal necrotizing fasciitis, sexually transmitted diseases, vasculitis, etc. [1,4]. Diagnosis is aided by scoring systems where a higher score implicates a poor prognosis. [1-3,5,6,8]. Workup includes laboratory investigations, blood cultures (usually negative), and tissue cultures [3,4].

Management involves adequate resuscitation, early diagnosis, and a combination of broad-spectrum antibiotics and emergency debridement. Serial debridement helps by maintaining healthy local tissue [3,7,9,10]. Literature reviews on the management of FG [7-10], note the following: (a) Extensive early debridement decreases mortality if done in the first 14 h after presentation. The higher the body surface area, the more progressive the disease is, and the more aggressive debridement is required. (b) Orchiectomy is avoided and not performed prophylactically. (c) Hyperbaric oxygen – controversial use as an adjunct, can decrease mortality by promoting epithelization, and healing, but has no impact on hospital stay. (d) Frequent minimum twice daily clean sterile dressings with active agents, and matrix compounds maintain healing and reduce hospital stay. (e) Negative pressure wound therapy at 50–125 mmHg, intermittently, after proper debridement, can create higher rates of wound closure, decreased pain, and improved ambulation. (f) Healing by secondary intervention is recommended for wounds at the anus or inguinal areas. (g) Skin grafts may cause contractures but are a reconstructive procedure when specialized care is not available or in the elderly. (h) Subcutaneous thigh pouches act as surgical cover but cause poor spermatogenesis. (i) Wound approximation is chosen when defect size is less than half the scrotum, with the advantages of good cover, surgical ease, and shorter hospital stay. (j) Tissue adhesives may play a role to hide abnormal contours of the perineum. (k) Muscle flaps may increase vascularity to a defect area but are burdened with hematoma, donor site abscess, and flap necrosis [7-10].

We present a series of four patients who presented with FG, with symptoms of 5–7 days. They had normal bowel, bladder habits, and stable vital signs on examination. Emergency debridement with optimum broad-spectrum parenteral antibiotics was given. To cover the defects, primary local closure using healthy skin or medial subcutaneous thigh pockets was undertaken. Given the COVID-19 pandemic situation, the median hospital stay was 3 days and follow-up with poor attrition. One patient expired due to COVID-19 pneumonia, one was reviewed 5 months later with excellent approximation, while the other two were lost to follow-up.

The skin around the scrotum has properties of protection and thermoregulation and hence acts as a natural barrier. Aggressive removal of tissue around the perineum is avoided as it creates a large scar, over granulating areas, and saving this highly vascular region provides satisfactory aesthesis, adequate functionality, and can be an alternative to muscle flaps, negative pressure therapy, and grafts. This local skin is used for surgery, and cosmesis, reports less infection and hospital stay, and in turn, increases function; in comparison to grafting, where, contractures with breakage and thinning, less lubrication can lead to higher patient dissatisfaction. We would like to mention our study has a small sample size with loss in attrition, which might reflect outcomes on a long-term basis.

CONCLUSION

This series demonstrates that utilizing local skin around the scrotum and perineum can be an efficient means of satisfactory restorative cosmesis and function in FG.

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