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Reconstructive strategies following Fournier's gangrene: A retrospective analysis of outcomes

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Abstract

Objective: Fournier's gangrene is a rapidly progressive and necrotizing infection of the perianal region and scrotum. Once clinical stabilization is achieved, the delayed reconstruction of the resultant defects can be planned. This study presents our institutional experience with reconstruction after Fournier's gangrene and discusses various surgical approaches along with their respective advantages and limitations.

Materials and Methods: A total of 21 patients were included in the study. The patients included in this study were older than 18 years with Fournier's gangrene and a minimal follow-up of 6 months postoperatively. Demographic and clinical variables, including mean age, defect size and location, comorbid conditions, time interval between initial debridement and reconstruction, type of reconstructive method used, postoperative hospital stay, and complication rates were analyzed.

Results: A total of 21 male patients aged 42-76 years with previously performed reconstruction following Fournier's gangrene. The defect most commonly involved the scrotum, and 68% of the scrotal skin was defective (38%–100%). Two patients had perineal involvement. Comorbidities were present in 86% of patients, most commonly diabetes mellitus. All patients received delayed surgical reconstruction after the appearance of healthy granulation tissue at the base of the wound. The mean time to reconstruction was 28.4 days (range, 15–56 days). The most commonly used reconstruction method was the scrotal flap alone (57%). The mean hospital stay after reconstruction was 7.2 days.

Conclusion: Fournier's gangrene is a rapidly progressive and fulminant necrotizing infection that requires prompt antibiotic therapy and aggressive surgical debridement. Reconstruction of soft tissue defects is essential for restoring functional and aesthetic integrity. The optimal approach should be individualized based on patient characteristics and defect features. Further comparative studies are required to refine the reconstructive strategies and improve the long-term outcomes.

Keywords: Fournier, gangrene, infection, reconstruction

Introduction

Fournier's gangrene is a rapidly progressive and fulminant form of necrotizing fasciitis that predominantly affects the scrotal, perianal, and genital regions. Fournier's gangrene predominantly affects males, with the scrotum being the most commonly involved site [1,2]. It is believed to result from a polymicrobial infection that advances to obliterative endarteritis with microthrombosis of the cutaneous and subcutaneous arterioles, leading to perifascial bacterial spread and subsequent gangrene of overlying tissues. Diabetes mellitus, alcoholism, obesity, and other states of immunosuppression are significant risk factors for Fournier's gangrene [3,4]. The diagnosis of Fournier's gangrene is primarily clinical in nature. Patients typically present with sudden onset of genital or perineal pain and swelling, accompanied by fever

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and systemic deterioration, which may rapidly progress to tissue necrosis with purulent discharge, crepitus or fluctuance, and ultimately septic shock [3,5].

Early diagnosis and prompt treatment are crucial in the management of Fournier's gangrene, as the disease progresses rapidly, is a true surgical emergency. Intensive fluid resuscitation, broad-spectrum intravenous antibiotic therapy, and urgent surgical exploration with aggressive debridement of all devitalized tissues are the cornerstones of treatment. Multiple debridement procedures are often required to achieve adequate source control and prevent further infection spread [6,7].

Reconstruction is planned after clinical stabilization and confirmed eradication of the infection, with the choice of technique largely determined by the size of the defect and the specific perineal tissue planes involved in the defect. Despite the many available reconstructive options, the overarching goal remains the restoration of functional integrity and satisfactory aesthetic outcome. For small and superficial defects in the perineal region, conservative wound care, primary closure, or split-thickness skin grafting may be sufficient. However, larger defects or those involving exposed vital structures generally require flap-based reconstructions [7,8].

Although a wide range of reconstructive options are available, no single technique is universally ideal or suitable for all cases. In this study, we present the patients in our center who underwent reconstructive surgery following Fournier's gangrene and discuss the reconstructive approaches presented in the current literature.

MATERIALS AND METHODS

This study was approved by the Institutional Review Board of Ankara Training and Research Hospital (Review No. E-25/769). This retrospective review was performed for patients who underwent reconstruction following debridement for Fournier's gangrene at our institution between July 2023 and August 2025. The patients included in this study were older than 18 years with Fournier's gangrene and a minimal follow-up of 6 months postoperatively. The exclusion criteria were a prior history of testicular surgery and loss to follow-up. Demographic and clinical variables, including mean age, defect size and location, comorbid conditions, time interval between initial debridement and reconstruction, type of reconstructive method used, postoperative hospital stay, and complication rates, were analyzed. Informed consent was obtained from all patients before data collection.

RESULTS

A total of 21 male patients aged 42-76 years with previously performed reconstruction following Fournier's gangrene. The mean age of the patients was 54.2 years. The patient demographics and characteristics are listed in Table 1. The defect most commonly involved the scrotum, and 68% of the scrotal skin was defective (38%–100%). Two patients had perineal involvement as well. Comorbidities were present in 86% of patients, most commonly diabetes mellitus. In 3 patients (14%), we could not find any associated predisposing factor. All patients received delayed surgical reconstruction after the appearance of healthy granulation tissue at the base of the wound. The mean time to reconstruction was 28.4 days (range, 15–56 days). The most commonly used reconstruction method was the scrotal flap alone (57%) (Figure 1). Superomedial thigh flap was performed in six patients (29%) (Figure 2) ,and skin grafting was used in three patients (14%). The mean hospital stay after reconstruction was 9.2 days. One patient (4%) developed wound dehiscence and partial necrosis was seen in one patient (4%) and both were treated conservatively.

DISCUSSION

Fournier's gangrene is a fulminant necrotizing soft-tissue infection involving the scrotal, perianal, and perineal regions, characterized by rapid extension into the surrounding tissues and a high risk of mortality despite prompt intervention [6,9]. Although its pathophysiology is primarily attributed to polymicrobial infection comprising both aerobic and anaerobic bacteria, acting in conjunction with subcutaneous arteriolar microthrombosis to induce rapidly progressive necrosis, the exact etiology remains controversial [10]. While Fournier originally described cases without any identifiable predisposing factor and approximately one-quarter of contemporary cases similarly present with no clear underlying cause, most patients exhibit comorbidities that compromise immune function.

Table 1. Patient demographics and characteristics of injury

	n (%)
Gender	
Male	21 (100)
Female	0 (0)
Age (years)	
Mean	54.2
Range	42-76
Defect Location	
Scrotal	21 (100)
Perineal	2 (9.5)
Comorbidities	
Diabetes Mellitus	9 (42)
Hypertension	6 (29)
Renal Failure	3 (14)
Alcoholism	1 (4)
Time to reconstruction (day)	
Mean	28.4
Range	15-56
Reconstruction method	
Scrotal flap	12 (57)
Superomedial thigh flap	6 (29)
Skin graft	3 (14)
Hospital stays after reconstruction	
Mean	9.2
Range	5-19
Complication	
Wound dehiscence	1 (4)
Partial graft necrosis	1 (4)

Conditions such as diabetes mellitus, alcoholism, obesity, and other states of immunosuppression are well-recognized contributors that may facilitate the onset and accelerate the progression of the disease. Additionally, an identifiable initiating factor—such as colorectal pathology, perianal skin infection, or urinary tract infection—can be observed [6,11,12]. In the present study, diabetes mellitus was likewise the most frequently encountered comorbid condition, a finding that aligns closely with previously published literature. Published mortality rates range widely

Figure 1. Reconstruction with scrotal flap after Fournier gangrene

a) Scrotal defect after Fournier gangrene
b) Intraoperative views of the scrotal flaps
c) Immediate postoperative result
d) Three-month post-operative result

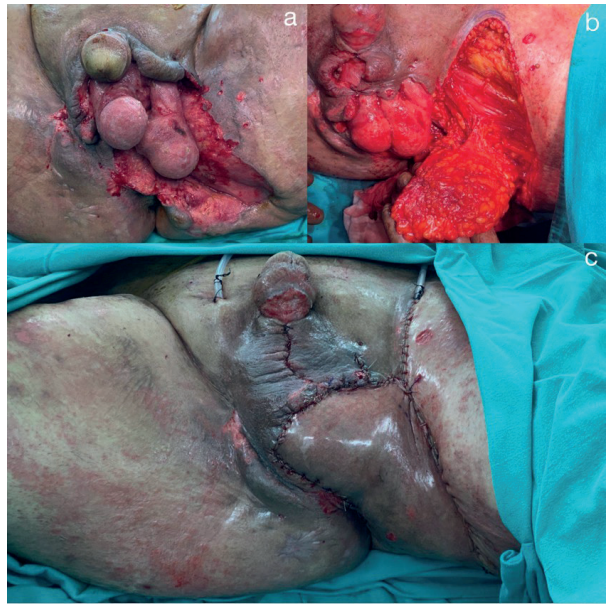

Figure 2. Reconstruction with superomedial thigh flap after Fournier gangrene

a) Scrotal and perineal defect after Fournier gangrene
b) Intraoperative views of the superomedial thigh flap
c) Immediate postoperative result

from 3% to 67%, reflecting heterogeneity in patient characteristics, treatment timing and disease severity. Collectively, these findings underscore the importance of early diagnosis, aggressive surgical debridement of necrotic tissue, broad-spectrum antimicrobial therapy and careful evaluation of patient-specific risk factors to optimize outcomes and guide ongoing discussions regarding the management of this life-threatening condition [1,13,14].

Once clinical stabilization is achieved and the infection is fully controlled, reconstruction of the resulting scrotal and perianal defects is necessary. Previous studies have reported an average interval of 33–35 days between disease onset and definitive reconstruction [1,3,15]. In the present study, this interval was little bit shorter, with a mean of 28.4 days, reflecting the time needed for adequate wound bed preparation and systemic stabilization. During this period, the patients were closely monitored by the urology department, and daily wound care was provided using conventional dressing methods or vacuum-assisted closure (VAC) therapy. VAC therapy has gained popularity following debridement, as it has been associated with reduced dressing-change frequency, decreased analgesic requirements, and—most notably—shorter hospital stays [16,17]. In the current study, the mean postoperative hospital stay following reconstruction was 7.2 days. According to the literature, the overall duration of stay at our institution was similar, suggesting that enhanced coordination with the urology department and integration of VAC therapy may help these outcomes and acceleration of the patient recovery and reduce hospitalization time [18,19].

The scrotum is the most frequently involved site in Fournier's gangrene, and consequently, post-infectious reconstruction is most commonly required in this region, with extension to the perianal area when necessary. Because the testes and spermatic cord receive their blood supply from sources distinct from the scrotal skin, they are generally spared from the necrotizing process and become exposed following the debridement of devitalized scrotal tissue. This anatomical preservation is clinically important because the testes maintain essential endocrine and reproductive functions, including testosterone production and spermatogenesis [1,6]. The optimal performance of these functions requires that the testes remain at a temperature lower than the core body temperature, underscoring the necessity of selecting reconstructive techniques that provide adequate protection and thermoregulation [20].

Reconstructive options for defects resulting from Fournier's gangrene include healing by secondary intention, primary closure, and various graft- or flap-based procedures. Because many patients present with significant comorbidities and are therefore considered high-risk surgical candidates, simple and single-stage reconstructive approaches are often preferred [7]. Primary closure can provide excellent functional and aesthetic outcomes; however, it is feasible only in very small defects where closure can be achieved without tension. Healing by secondary intention is another option for relatively limited defects or for patients with elevated anesthetic risk, although this approach is associated with prolonged healing times and an increased likelihood of wound contraction and deformity [3]. Skin grafts may be employed in cases where the tunica vaginalis remains intact and is adequately protected. However, their use is limited by challenges in graft adherence to the underlying tissues, which can compromise graft survival. In addition, skin grafts are generally less favored today because they provide fragile and insensate coverage, and graft contracture may lead to discomfort or even impaired testicular mobility, potentially causing dyspnea-like pain responses. However, cosmetic outcomes are often suboptimal [1,20]. Nevertheless, Tan et al. reported that grafts tend to soften within six months, eventually permitting testicular movement, and suggested that skin grafting remains a suitable option, particularly for elderly or comorbid patients, given the relative ease of the procedure and shorter operative duration compared with flap-based methods [21]. Scrotal flaps represent an excellent reconstructive option for small- to medium-sized scrotal defects, offering durable, high-quality coverage and favorable aesthetic outcomes while maintaining low donor-site morbidity (Figure 3). The technique is relatively straightforward and involves circumferential undermining of the remaining scrotal skin, effectively utilizing the inherent laxity and extensibility of the scrotum to achieve adequate tissue mobilization for defect closure [1,3]. In the present study, scrotal flaps were utilized in %57 of the patients with Fournier's gangrene. Currently, there is no consensus on the optimal reconstructive method for Fournier's gangrene, as multiple techniques can achieve satisfactory soft tissue coverage. These include

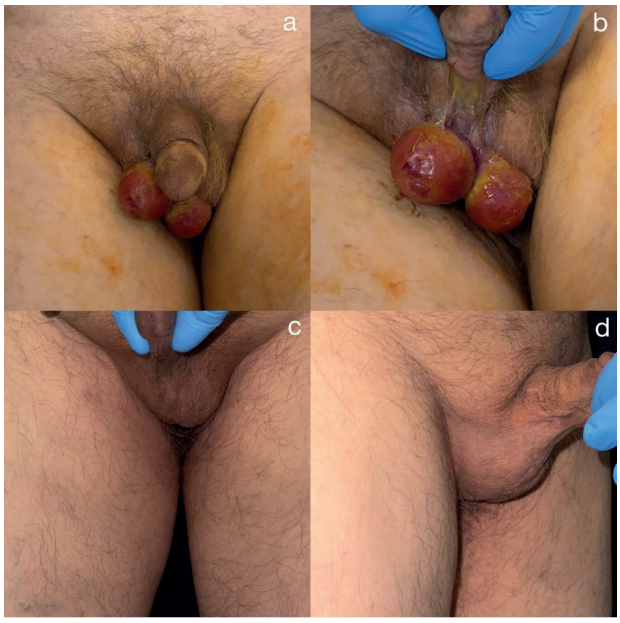

Figure 3. Reconstruction with scrotal flap after Fournier gangrene

a-b) Preoperative views Scrotal defect after Fournier gangrene

c-d) Postoperative 9-month result

split- or full-thickness skin grafts, local advancement flaps, scrotal flaps, fasciocutaneous flaps, muscle or myocutaneous flaps, perforator-based flaps, and testicular transposition in selected cases. Given the wide range of available reconstructive techniques, the optimal approach must be tailored to each patient. The selection of the most appropriate method should account for multiple factors, including the location and size of the defect, presence of cavitation, patient's overall medical status, age, and functional or aesthetic expectations, as well as the experience and technical preferences of the surgeon. Therefore, individualized decision-making remains essential for achieving successful outcomes in the reconstruction of Fournier's gangrene defects [1,3,6,22].

The limitations of this study include its retrospective design and single-center nature. Furthermore, the relatively small sample size represents an additional weakness that may affect the generalizability of the results.

CONCLUSION

Fournier's gangrene is a rapidly progressive and fulminant necrotizing infection that requires prompt antibiotic therapy and aggressive surgical debridement. Once infection control is achieved, early reconstruction of soft tissue defects is essential for restoring functional and aesthetic integrity. Although several reconstructive methods can yield satisfactory outcomes, no single technique is preferred for all patients. The optimal approach should be individualized based on patient characteristics and defect features. Further comparative studies are required to refine the reconstructive strategies and improve the long-term outcomes.

Author contribution

Conception and design: E.B.; Data acquisition: E.B.; Data analysis: E.B.; Data interpretation: E.B.; Drafting of the manuscript: E.B.; Critical revision of the manuscript: E.B.. The author reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Institutional Review Board of Ankara Training and Research Hospital (Date: January 15, 2026, Decision/Protocol No: Review No: E - 25/769). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The author declares that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The author declares that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

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