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Management of Perineo-Scrotal Tissue Loss Following Fournier's Gangrene: Experience of the Department of Plastic and Reconstructive Surgery at Ibn Sina University Hospital, Rabat

Dr. D. Jaadi[1]*, Dr. H. Regragui[1], Dr. I. Khaled[1], Prof. J. Hafidi[1], Prof. N. Gharib[1], Prof. A. Abbassi[1], Prof. S. El Mazouz[1]

[1]Department of Plastic and Reconstructive Surgery, Ibn Sina University Hospital, Rabat, Morocco

***Corresponding author:** Dr. D. Jaadi
Department of Plastic and Reconstructive Surgery, Ibn Sina University Hospital, Rabat, Morocco

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Abstract: **Original Research**

***Introduction*:** Fournier's gangrene is a rare but severe necrotizing bacterial dermohypodermitis that requires extensive surgical debridement, often exposing the genital organs and resulting in significant tissue loss. ***Objective*:** To describe our experience in the coverage of perineo-scrotal defects following Fournier's gangrene and to analyze the functional and aesthetic outcomes achieved. ***Methods*:** A retrospective study was conducted between August 2020 and August 2024 at Ibn Sina University Hospital in Rabat. Epidemiological, clinical, and therapeutic data from 38 patients were analyzed. ***Results*:** The mean age was 54 years (range 20–75). The tissue loss was isolated to the perineo-scrotal region in 61% of cases. Skin grafting was the most commonly used coverage method, followed by direct suturing. Advancement flaps were preferred when scrotal skin was available. Postoperative outcomes were uneventful in the majority of cases. The postoperative satisfaction rate was 94%. Minor complications were observed in 11% of patients. ***Conclusion*:** Perineo-scrotal reconstruction following Fournier's gangrene primarily relies on skin grafting and direct suturing with advancement flaps, allowing for adequate coverage, fertility preservation, and favorable aesthetic outcomes.

Keywords: Fournier's gangrene, perineum, scrotum, skin graft, flap, reconstruction.

INTRODUCTION

Fournier's gangrene is an acute necrotizing fasciitis, first described in 1883 by Jean Alfred Fournier [1, 7], that primarily affects the skin and soft tissues of the perineum, scrotum, and perianal region [1, 4, 6]. This polymicrobial infection progresses rapidly and carries a high potential for severity, with elevated morbidity and mortality rates, and is more common in men. It is favored by risk factors such as diabetes mellitus, alcoholism, obesity, immunosuppressive states, local trauma, perianal and perineal infections, and surgical procedures in the affected area [1, 6, 9]. Its rapid progression is due to obliterative endarteritis and microthrombosis of the cutaneous arterioles, facilitating perifascial bacterial spread and extensive tissue necrosis [6, 10].

Treatment of this medical and surgical emergency is based on broad-spectrum antibiotic therapy, appropriate resuscitation, and especially aggressive and iterative surgical debridement until healthy tissue is obtained [1, 4, 6, 10]. This radical treatment often results in major soft tissue loss, exposing the testicular structures and presenting a major challenge for plastic surgeons [2, 4, 5, 8, 9].

The management of perineo-scrotal tissue loss aims to restore protective coverage of the testes, preserve their function, restore an acceptable appearance, and support the psychological and sexual well-being of the patient [2, 4, 5, 8, 9]. Multiple techniques have been described: healing by secondary intention, testicular burial in the thigh, skin grafting, local flaps, fasciocutaneous, musculocutaneous, or free flaps [1, 2, 5, 7, 8, 9, 10]. There is no general

consensus on the best reconstruction method or on how to manage the exposed testicle; the choice depends on the extent of the defect, the general condition of the patient, and tissue availability [2, 4, 5, 8, 10].

Materials and Methods

A retrospective study was conducted in the Department of Plastic and Reconstructive Surgery at Ibn Sina University Hospital in Rabat over a four-year period (August 2020 – August 2024). Thirty-eight patients treated for perineo-scrotal tissue loss secondary to Fournier's gangrene were included.

The collected parameters included: age, medical history, clinical features, type and extent of tissue loss, reconstruction techniques used, and postoperative complications.

The choice of reconstructive technique depended on several factors: the area requiring coverage, availability of residual scrotal skin, degree of testicular retraction, and the patient's general condition.

Surgical options included:

- **Scrotal advancement flap**, when residual skin was sufficient;
- **Direct closure following testicular burial**, in cases of insufficient scrotal skin;
- **Split-thickness skin grafting on a granulation bed**, when direct coverage was not feasible.

RESULTS

The mean age of the patients was 54 years, with a range of 20 to 75 years. No significant medical history was noted in the majority of cases. The tissue loss was isolated to the perineo-scrotal region in 61% of patients.

The most frequently used reconstruction technique was skin grafting, selected for its simplicity and aesthetic result similar to native scrotal skin. Direct closure using scrotal advancement flaps was performed whenever sufficient residual scrotal skin was available. In the remaining cases, direct closure following testicular burial was employed.

Postoperative outcomes were generally uneventful. Minor complications—such as partial wound dehiscence or hematoma—were observed in 11% of patients. One exceptional case involved recurrence due to an underlying tumor process, with biopsy revealing squamous cell carcinoma. Healing was deemed excellent, with an overall patient satisfaction rate of 94%. Six percent of patients reported a sensation of heaviness or residual pain, requiring additional testicular repositioning. One patient developed a urethral fistula that required specific management.

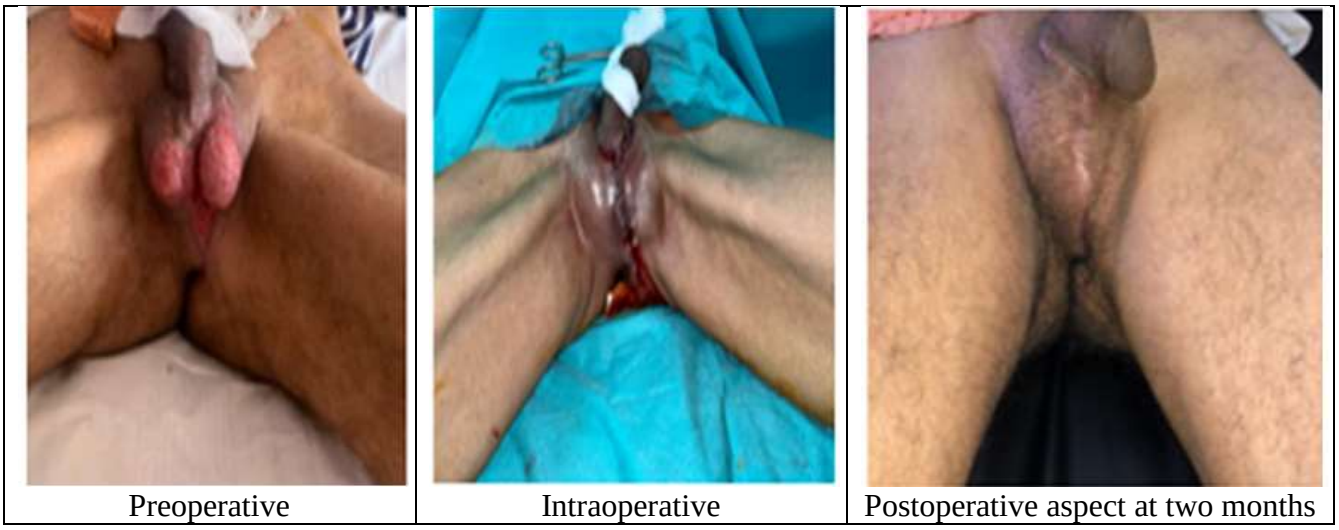

Figure 1: A 52-year-old patient with no prior medical history underwent scrotal advancement flap reconstruction

Preoperative

Intraoperative

Postoperative aspect at two months

Figure 2: 32-year-old diabetic patient who underwent a skin graft

DISCUSSION

Fournier's gangrene is a rapidly progressing necrotizing fasciitis, representing a serious medical-surgical emergency. Historically known since the time of Avicenna and later formalized by Jean Alfred Fournier in 1883 [3], its pathophysiology involves polymicrobial infection, obliterative endarteritis, and vascular thrombosis, leading to extensive necrosis of the perineal and scrotal soft tissues, thus requiring aggressive and iterative treatment [3, 4].

Classic risk factors—such as diabetes, alcoholism, immunosuppression, poor hygiene, and multiple comorbidities—are well established, underscoring the importance of early diagnosis and immediate multidisciplinary management [3, 4].

Treatment relies on a triad of essential components: appropriate resuscitation, broad-spectrum antibiotic therapy, and extensive surgical debridement [3, 4]. Radical debridement is crucial for infection control, but it often results in significant tissue loss in the scrotal and perineal regions, directly exposing the testes and spermatic cords. This exposure poses a dual challenge: preventing secondary infection and preserving testicular function—especially spermatogenesis and thermal regulation—which are vital for future fertility [3, 4, 10].

Scrotal reconstruction thus becomes a critical phase, not only for restoring physiological function and protecting spermatogenesis but also for ensuring an acceptable cosmetic result, particularly in younger patients for whom the psychosexual impact is substantial [5, 6].

In this context, various reconstruction techniques are available and must be tailored to the specific clinical situation. For limited defects, the scrotal advancement flap offers a simple and effective solution, respecting the principle of "replacing like with like" [9]. This technique provides homogeneous coverage with texture and color similar to native scrotal skin, while minimizing donor site morbidity [8, 9]. In our series, this method yielded favorable outcomes for defects involving no more than 50% of the scrotal surface, consistent with success rates reported in the literature [9].

For more extensive defects, skin grafting remains a widely used option due to its technical simplicity, low cost, and acceptable functional and aesthetic results [6, 9]. However, this technique has certain limitations: slower healing, risk of scar contracture, and less protection against external trauma [6, 7]. It remains indicated for covering large surface areas quickly, especially when local tissue is unavailable.

For more complex or deep defects, the use of fasciocutaneous or musculocutaneous flaps—such as the medial thigh fasciocutaneous flap or the gracilis flap—provides durable, well-vascularized coverage with reduced susceptibility to infection [1, 2, 5, 7]. These techniques, although more time-consuming and technically demanding, offer superior mechanical resistance and aesthetically satisfying integration [1, 2, 10].

Testicular burial in the thigh, while simple and rapid, is no longer recommended as a definitive solution due to its negative aesthetic and psychological effects, as well as the potential impairment of spermatogenesis [5, 10].

In our experience, the rate of minor complications—mainly partial graft loss or marginal flap necrosis—was comparable to those reported in other studies [6, 9]. Most of these issues were managed with conservative local care and did not compromise the final outcome.

Finally, the impact of reconstruction technique on testicular function and fertility remains insufficiently documented. Some experimental studies suggest better preservation of spermatogenesis with skin flaps compared to grafts [10]. Others emphasize the importance of maintaining scrotal thermoregulation to avoid hyperthermia, particularly when using thick flaps in obese patients [5, 10].

Based on our experience and current data, we propose a rational algorithm: For defects < 50% of the scrotum: scrotal advancement flap or healing by secondary intention.

For defects > 50% or involving the perineum: local or locoregional fasciocutaneous flap (e.g., SMTF, pudendal, ALT) or gracilis musculocutaneous flap for deep cavities.

Skin grafting: reserved for fragile patients or granulating wound beds, with caution to avoid contractures. Testicular burial: to be avoided as a definitive reconstructive option.

Reconstructive management should remain individualized, taking into account the extent of tissue loss, frequent comorbidities (e.g., diabetes, alcoholism), the patient's socioeconomic context, and expectations in terms of sexual function and cosmetic outcome [3, 7, 8]. Using a decision-making algorithm that considers defect volume, surrounding tissue viability, and overall patient condition optimizes outcomes and reduces morbidity [6, 10].

Ultimately, early and appropriate coverage of scrotal defects is essential to limit infectious complications, promote healing, and preserve reproductive function, while achieving satisfactory aesthetic results.

CONCLUSION

Coverage of perineo-scrotal defects following Fournier's gangrene is a frequent challenge in reconstructive surgery. Skin grafting and direct suturing using scrotal advancement flaps are the most effective options to ensure adequate coverage, satisfactory aesthetic outcomes, and preservation of fertility. Management should be multidisciplinary and adapted to each patient to optimize results.

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