



International Journal of Scientific Research in Dental and Medical Sciences

www.ijsrdms.com



Scrotal Defects Reconstruction after Fournier's Gangrene

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ARTICLE INFO

Article history:

Received 19 October 2021

Received in revised form 27 November 2021

Accepted 09 December 2021

Available online 10 December 2021

Keywords:

Fournier gangrene

Genitalia

Perineum

Scrotum

ABSTRACT

Background and aim: Fournier's gangrene is necrotizing fasciitis of the perineum and external genitalia. It involves the perianal area and scrotum. Adequate wound debridement, a broad-spectrum antibiotic, and fluid replacement therapy are all part of the treatment plan. After clinical stabilization, reconstruction can be planned secondarily.

Materials and methods: Fifteen patients who underwent reconstruction after Fournier's gangrene in 2017 July to 2019 June at Burn and Plastic Surgery Department, Rajshahi Medical College Hospital, were analyzed retrospectively. All the patients were referred from General Surgery wards after completing initial management. Informed consent was obtained from all patients.

Results: The most commonly used reconstructive methods were Scrotal advancement flaps, Pudendal thigh flap, medial thigh flap, Superomedial thigh flap. Penile wound coverage by split-thickness skin grafting was done in 03 cases. After reconstruction, the mean hospital stay was 5 days. 03 patients developed marginal flap necrosis (<5 mm), 5-10 mm tip necrosis in 02 cases and necrosis at three-point stitch area were in 03 cases. All the marginal necrosis and dehiscence areas healed conservatively. Due to negative suction drains, there were no Hematoma or Seroma complications.

Conclusion: There is no perfect method for all patients. Instead, the ideal methodology is determined by the patient's age, expectations, and overall condition, defect characteristics, and the surgeon's experience.

1. Introduction

Fournier's gangrene is a scrotal, perianal, and genital necrotizing fasciitis. It progresses rapidly and is fatal; most patients are presented with a scrotal wound^[1] or wound over both penis and scrotum. This infection is caused by polymicrobial infection and subcutaneous arteriolar micro thrombosis. Often, comorbidity that causes immunosuppression may present. Management starts as an emergency because this disease progresses very quickly. Early wound debridement, intravenous broad-spectrum antibiotic therapy, and fluid resuscitation are the early mainstay of the treatment plan. Reconstructive surgery can be planned after adequate clinical stabilization of the patient and eradication of infection. Reconstructive options are split-thickness skin grafting,^[2] using residual scrotal tissues,^[3] a temporary or permanent adaptation of the exposed testes into the medial thigh,^[4] local fasciocutaneous flaps,^[5] musculocutaneous flaps,^[6] or even free flaps^[7] can be used. Despite the reconstructive options available, no single method is ideal and applicable for all cases. This study presents reconstructive surgery cases after Fournier's gangrene at our center using different methods according to defect size and site.

2. Materials and methods

Fifteen male patients of 35 to 65 years of age who underwent reconstruction after Fournier's gangrene in 2017 July to 2019 June at Burn and Plastic Surgery Department, Rajshahi Medical College Hospital, were analyzed retrospectively. This is an observational study of the patients to whom scrotal reconstruction is done by flap surgery instead of skin grafting or burying the testes within the thigh, whether they are satisfied with or not both psychologically and functionally. All the patients were referred from General Surgery wards after completing initial management. Informed consent was obtained from all patients.

3. Results

Fifteen male patients ages were ranges 35–65 years. The defect most commonly involves the scrotum, which has exposed testes. Three patients had gluteal region involvement. Among them, 07 have uncontrolled diabetes mellitus, 03 have a previous history of perianal abscess, 05 have STD. The most commonly used reconstructive methods here were Scrotal advancement flaps (03) [Fig. 1], Pudendal thigh flap (unilateral 02, bilateral 05) [Figs. 2, 3], Medial thigh flap (bilateral 03) [Fig. 4], Superomedial thigh flap (bilateral 02) [Fig. 5]. Penile wound coverage by split-thickness skin grafting was done in 03 cases. After reconstruction, the mean hospital stay was 5 days. 03

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<http://doi.org/10.30485/IJSRDMS.2021.315745.1217>



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marginal necrosis and dehiscence areas healed conservatively. Due to negative suction drains, there were no Hematoma or Seroma complications.



Fig. 1. (a) scrotal defect after Fournier gangrene. (b) after reconstruction with scrotal advancement flap.



Fig. 2. (a) scrotal defect. (b) after reconstruction with pudendal thigh flap(Unilateral).



Fig. 3. (a) scrotal defect. (b) Perioperative picture of reconstruction with pudendal thigh flap(Bilateral).



Fig. 4. (a) Defect with perianal abscess drain incision. (b) reconstruction with medial thigh flap(Bilateral).



Fig. 5. (a) scrotal defect with the perianal wound. (b) reconstruction with superomedial thigh flap(Bilateral).

4. Discussion

Fournier's gangrene is a scrotal, perianal, and genital necrotizing fasciitis. With subcutaneous arteriolar micro thrombosis, a polymicrobial infection caused by anaerobic and aerobic bacteria leads to gangrene in the affected tissues. Necrosis progresses rapidly, and there is 3%–67% mortality.^[8] Although it was described by Fournier in 1883 as a necrotizing infection in a healthy male patient without any cause,^[9] the current definition of the disease is quite different, i.e., a necrotizing infection due to a specific cause in an old patient with comorbidity.^[10] An initiating cause such as colorectal disease, perianal skin infection, or urinary infection is seen in most patients. Again, The most common comorbidity is diabetes mellitus.^[5, 8] Diabetes mellitus was also the most common comorbidity in our study. As the disease progresses rapidly, treatment includes debridement of the necrotized tissues, broad-spectrum antibiotic therapy preferably according to culture sensitivity, and fluid replacement therapy. After clinical stabilization of the disease and eradicating the infection, the scrotal and perianal defects warrant reconstruction surgery. The mean time from disease occurrence to defect reconstruction is 33–35 days.^[5, 8] This period involves clinical stabilization of the disease and wound preparation for reconstruction. In the present study, the average hospital stay following reconstruction is 5 days. Most hospital stays involve clinical stabilization of the disease and preparation for reconstruction for patients. Compared with the literature, the duration of stay at our hospital was shorter. The most common site of Fournier's gangrene is the scrotum.^[8] Therefore, reconstruction after Fournier's gangrene is performed mainly in the scrotum, and if necessary, in the perianal region. The testis and spermatic cord blood supply is different from the skin circulation; the testes are not usually affected by the necrotic infection and are exposed after debridement of the scrotal skin. Covering the testes is another challenge for the plastic surgeon. Due to its unique flexible structure, losses of up to 50% of scrotal skin can be repaired with scrotal musculocutaneous flap.^[11, 12] This is the most cosmetic and functional reconstruction. However, no specific reconstructive method applies to all with >50% scrotal skin loss.

Skin grafts can be used in cases where the tunica vaginalis is protected. However, the difficulty in its adaptation to the base is a disadvantage for graft intake. Moreover, skin grafts are not widely used because their coverage is fragile and non-sensitive, as trauma and pain cause dyspnea in the testes because of the development of graft contracture and are cosmetically unsatisfactory. Nevertheless, Tan et al. asserted that the graft softens within 6 months and even allows for testicular movement, and is also recommended particularly in elderly and comorbid patients because reconstruction with grafts can be easily applied and the duration of the operation is relatively short.^[13] It should be noted that the testes have such functions as secreting testosterone and ensuring spermatogenesis. The testes must be at a lower temperature than the body to perform such functions. While no reconstruction method available can mimic the special environment provided by the scrotum, Demir et al. show in their experimental study that reconstruction with skin flap does not reduce spermatogenesis. In contrast, reconstruction with grafts leads to significantly decreased testicular volume and spermatogenesis, and they recommend reconstruction with skin flap.^[14] Another reconstruction method is the temporal or permanent adaptation of the testes into the medial thigh. In a study of 12 patients, Okwudili reported that the testes adapted to the medial thigh, passing down into the residual scrotal sac within 6 months through testicular massage.^[4] Emphasizing that reconstruction shortens the length of hospital stay because it is a simple operation, the author also reported that testis volume is not decreased, based on ultrasonographic measurement of the postoperative testicular volume. However, the author did not report how spermatogenesis is affected. Similarly, residual infection in

the testes leads to medial thigh pouch infection.^[21] Considering that the literature states that it adversely affects spermatogenesis and has adverse cosmetic and psychosocial effects, we did not use this method for any of our patients. With scrotal defects smaller than half the surface area of the scrotum, Cheng et al. reported success with the scrotal advancement flap. Because the closure should be tension-free, the authors suggested caution when using this flap for defects more significant than half of the scrotum.^[11, 12]

Fournier's gangrene has described numerous fasciocutaneous flaps for scrotal and perineal reconstruction, typically with superior durability and cosmetic effects than split-thickness skin grafts because they provide good coverage without sacrificing functioning muscles. Flaps are frequently found in the medial thigh. One of them is the superomedial thigh fasciocutaneous flap, which is supplied by a combination of the deep external pudendal artery, the anterior branch of the obturator artery, and the medial femoral circumflex artery, as first described by Hirshowitz et al. in 1980.^[16] In the literature, the ideal scrotal reconstruction method is described as pliable, sensitive, trauma resistant, aesthetically acceptable, and that would not lead to the bulky formation. Local/locoregional fasciocutaneous flaps are recommended as the reconstruction option closest to the ideal.^[17] Among these, superomedial thigh flap ensures single-stage operation, reliable vascular feeding, and requires no patient position change on the surgical table.^[5, 16] It is also a sensate flap. In most cases, it provides enough scrotal coverage with aesthetically acceptable results and simple primary donor site closure. So, this flap is also our first choice for total and near-total scrotal skin defects. The medial thigh fasciocutaneous flap, first described by Wang et al. in 1987, was later described by Hallock et al. in 1990 for scrotal reconstruction after Fournier's gangrene.^[18, 19] It is vascularized using a communicating suprafascial vascular plexus of flaps up to 9x20 cm in size. In most cases, the donor site allows for immediate closure. Another alternative is to use the pudendal thigh flap supplied by the internal pudendal artery branches. Primary donor site closure is possible and aesthetic results are satisfactory when designed laterally to the crural-inguinal fold. It also includes the superficial perineal nerve,^[17] making it a sensate flap. Anterolateral thigh flap is another option for scrotal defects with extensive perianal wounds, in addition to these significant techniques.^[21] The best method for reconstruction in patients with Fournier's gangrene is debatable, and the procedure should be chosen based on the defect's characteristics, the patient's preferences, and the surgeon's experience. Compared to skin grafting, flap coverage probably provides better testicular protection with a lower incidence of contraction. Although it requires more difficult and time-consuming procedures, it is associated with higher donor-site morbidity and may be excessively bulky. Authors have differing perspectives on cosmetic outcomes. However, in our experience, all the patients are satisfied with their neo-scrotum. A weakness of the study is that it is impossible to compare methods due to the limited number of patients and to compare the performance of conventional reconstruction options on the limited number of patients.

5. Conclusion

There is no perfect method for all patients. Instead, the ideal methodology is determined by the patient's age, expectations, and overall condition, defect characteristics, and the surgeon's experience. In our study, we want to show that flap reconstruction for scrotal defects is a better option than Skin grafting or burying the testes within the thigh. Flap reconstruction can satisfy a patient both psychosexually and functionally.

Conflict of Interest

The authors declared that there is no conflict of interest.

Acknowledgements

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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How to Cite this Article: Nazneen A. Scrotal Defects Reconstruction after Fournier's Gangrene. *International Journal of Scientific Research in Dental and Medical Sciences*, 2021;3(4):184-187. <http://doi.org/10.30485/IJSRDMS.2021.315745.1217>.