

Exposed Testicle Management in Fournier's Gangrene: Thigh Pouch Implantation as a Potential Definitive Option

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Abstract:

Introduction: Fournier's Gangrene is a necrotizing infection of the perianal region and scrotum. It progresses very rapidly and is fatal due to its associated varieties of comorbidities. So massive debridement of the necrotic tissues required. Those who survived have massive skin loss at the scrotum. There are varieties of surgical options available for closure of the scrotum cosmetically. In elderly patients with comorbidities those who are not willing for orchiectomy and want to preserve the testis, the thigh pouch implantation would be a better option.

Objective: To study the consequences after transplantation of testicles into the anteromedial aspect of the thigh pouch in patients with Fournier's gangrene with massive scrotal skin loss.

Materials and Methods: Nine patients of Fournier's gangrene were included in our study and were analyzed retrospectively. All have undergone initial extensive debridement of necrotic tissue and stabilization of sepsis by broad spectrum antibiotics. Later on the exposed testicle is transposed into the anteromedial aspect of the thigh after creating a subcutaneous pouch there. The mean age, defect percentage, location, associated comorbidities, mean time for reconstruction, duration of hospital stay and complication rates were calculated.

Results: Among the nine patients the most common comorbidity was Diabetes Mellitus (66%), and others are chronic kidney diseases (33%), Hypertension (55%). The average time of hospital stay for reconstruction was 15 days and average time of hospital stay after reconstruction was 7 days. Two patients (22%) developed wound infection which was managed conservatively.

Conclusion: Implantation of testicles into thigh pouches can serve both as an interim management to preserve the exposed testicles and facilitate wound care healing and may be approached as a long term surgical solution especially in older patients with multiple comorbidities.

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Introduction

Fournier's gangrene is a rapidly progressive necrotizing fasciitis of the genital and perineal tissues that typically affects males over the age of 50 years old, although females and patients of any age may be affected. [1,2] It is caused by a polymicrobial infection that progresses to obliterative endarteritis with microthrombosis of cutaneous and subcutaneous arterioles and perifascial spread of bacteria, causing gangrene of overlying tissues. [1,2,3] The cause of infection in the majority of cases, most often dermatological, colorectal or urological. [1,2,4] Comorbid conditions resulting in immunosuppression such as

diabetes mellitus, alcoholism, obesity are considered risk factors. [2,5]

Fournier's gangrene is usually diagnosed clinically. Its presentations are sudden onset of genital or perineal pain and swelling, fever and prostration with progression to tissue necrosis with purulent discharge, crepitus or fluctuation and septic shock. [2,5] Imaging studies such as ultrasonography, computed tomography (CT) or magnetic resonance imaging (MRI) may be helpful in early diagnosis or in atypical presentations and in evaluating the extent of the disease suggested by thickening of the scrotal wall and presence of gas in subcutaneous tissue. [1,3,5] CT is the most specific for diagnosis

and can also aid in preoperative planning and investigation of the underlying causes. [1,3] Bacterial culture is polymicrobial including anaerobes and aerobes. [1,2,3]

Scrotal reconstruction following debridement is complex. Reconstructive procedures needed for skin cover, cosmesis and function of the testes. Current reconstructive options include split thickness skin graft, full-thickness skin graft, local advancement flap, fasciocutaneous flap, muscle flap, or myocutaneous flap. Small defects can be left to heal by secondary intention. The use of grafts with adjunctive negative pressure therapy is the most common form of reconstruction, often providing a better outcome than bulky flaps, but requires an intact tunica vaginalis. Open-meshed split-thickness grafts are preferred for scrotal reconstruction as it provides easy access to contour around the testicles, better cosmetic outcome and less chance of seroma formation.

Care must be taken to avoid testicular retraction after initial surgical debridement while awaiting definitive coverage. Retraction can be a significant problem thereby giving rise to incidental testicular trauma and pain, limiting options for definitive surgery, and causing abdominal implantation as a need.[6] Traditional methods of interim management such as leaving the testicles open can lead to retraction. Burying the testicles in a subcutaneous pouch in the upper thigh can be used as a definitive treatment but cosmetically unacceptable to the young patient and have a risk of infertility as there is high risk of spermatic cord necrosis.[7] The objective of this study is to review our single institutional strategies for management of testicles following initial debridement and stabilization.

Objective: To study the consequences after transplantation of testicles into the anteromedial aspect of the thigh pouch in patients with Fournier's gangrene with massive scrotal skin loss.

Materials and Methods

We performed a retrospective review of nine patients diagnosed with Fournier's Gangrene who underwent reconstruction after debridement in our department of General Surgery, VIMSAR, and Burla during 2020-2022.

The mean age, defect size and location, associated comorbidities, average time to reconstruction, average hospital stay after reconstruction, and complication rates were evaluated. Informed consent was obtained from all patients. All have undergone initial extensive debridement of necrotic tissue and stabilization of sepsis by broad spectrum antibiotics. Later on the exposed testicle is transposed into the anteromedial aspect of the thigh after creating a subcutaneous pouch there.

Reconstructive procedures are considered once the patient is stable and there are no signs of infection and evidence of healthy granulation tissue in the wound bed and over testis [Figure-1], [Figure-2] .

The testicles are positioned in the pouch, as the normal anatomical position as possible by placing two or three interrupted sutures, 5 mm apart, and taking large bites of the tunica vaginalis [Figure-3]. The wound dressed with either conventional dressings after putting an open drain or negative pressure drain.

Ethical Approval:

Approval obtained from Veer Surendra Sai Institute of Research and Ethical Committee, Burla.

Result

The mean age of the 9 male patients was 63 (range, 46–86) years [Table]. The defect most commonly involved the scrotum. On an average, 65% of scrotal skin was lost (50%–90%). Comorbidity was present in 77% of patients, of which 66% was diabetes mellitus, 55% was hypertension, 33% was chronic kidney disease, and 11% was immunocompromised like HIV reactive. The mean time to reconstruction was 15.11 days (range 8–28 days). Bilateral thigh pouch reconstruction was performed in 4 patients and unilateral reconstruction done in 5 patients. The mean time to hospital stay after reconstruction was 7.22 days (range 5-14 days). Two patients (22.2%) developed wound infection and were treated with a conservative approach.

Thigh pouch reconstruction was performed in all patients, not only as a temporary modality to preserve the exposed testicle, but also to facilitate wound care and reconstructive process of perineal tissue in these critically ill patients. In follow up, one patient died, while two patients were lost to follow up.

These two patients were contacted by telephone, reported no complaint from a testicular standpoint, and refused any further reconstruction attempt. Six patients (with testicles in thigh pouches) were followed with scrotal ultrasound. None of them reported any pain, discomfort or other complaints in different body positions or while ambulating. Two patients had minimal focal tenderness with palpation of testicles on physical exam. Scrotal USG was performed after three months of surgery. One of the thirteen testicles showed a decrease in volume from 16.23 to 11.88 ml.

There was no noted abnormality in size of the other twelve remaining testicles. All those 9 patients with thigh pouches were offered repositioning of testicles to a natural location with reconstructive surgery. All of these patients refused additional surgical intervention. No patient reported any

complaints associated with the placement of the



Figure 1: Scrotal wall loss in Fournier gangrene

testicles in the anteromedial thigh pouch.



Figure 2: After multiple debridements, wound shows sign of no inflammation and healthy granulation tissue



Figure 3: Post-operative photo showing thigh implantation of B/L testicles



Figure 4: healthy post-operative wound after removal of drains.

Discussion

We observed a variety of comorbid conditions associated with Fournier's gangrene (FG) but not limited to diabetes mellitus, obesity, hypertension, and chronic renal failure. In our patient population, diabetes mellitus was found in 66.6% of the patients, substantially higher than an average of 37% reported in a large national study of 1,680 patients [8]. 55.5% of our patients had hypertension compared to a reported average of 31% [8]. Jeong, et al. reported 15% rate of chronic renal failure in a series of 40 patients, but in our observed rate was 33.3% [9]. Primary or secondary wound closure is an ideal reconstruction method following extensive perineal debridement.

The extent of tissue damage, the anatomy of the patient's perineum, the patient's baseline general medical condition and surgeon's preference will

guide which type of reconstructive procedure is best for the patient. Chen, et al. described a reconstructive strategy wherein patients with minor defects receive delayed primary closure while patients with moderately severe defects involving the scrotal area (<50% involvement) receive a scrotal advancement flap and patients with more severe defects (>50% involvement of scrotal area) undergo creation of pudendal thigh flaps [10].

Additionally, patients with deep tissue damage receive a gracilis muscle flap, and patients with large areas of involvement, especially those patients exhibiting abdominal wall involvement, receive split thickness skin grafts. Spyropoulou, et al. also demonstrated reconstruction of perineoscrotal lesions secondary to Fournier's gangrene with pedicled anterolateral thigh flaps [11].

In this series of scrotal FG, we report on those of our patients with greater than 50% loss of scrotal skin [Figure 1]. In the management of such patients the most challenging part is how to create perineal wound cover. Satisfactory perineal wound cover is important for cosmetic, psychological, and functional reasons.[12,13] In patients with extensive scrotal loss, if primary closure cannot be achieved following surgical debridement of necrotic tissue, management of the exposed testes becomes a significant concern.

Most commonly delayed primary wound closure is done after serial debridement and when healthy granulation tissue has formed. However, when much of the scrotal skin is lost, achieving scrotal wound closure can be a daunting challenge. This is especially so if the testes which are usually uninvolved must be preserved and accommodated in the scrotal pouch. Thigh pouches allow delayed primary closure in patients with extensive (>50%) loss of scrotal skin.[14] So we used the procedure that the testicles were sutured together using an interrupted absorbable braided suture (e.g., 3/0 Vicryl). The testicles were positioned side by side, as close to the normal anatomical position as possible by placing two or three interrupted sutures, 5 mm apart, and taking large bites of the tunica vaginalis. The wound was dressed with conventional dressings depending on the location and size of the wound. Our data indicates that change in testicle size and patient discomfort following relocation of the testes from the diseased scrotum to the anteromedial thigh pouch was minimal. We furthermore experienced a case wherein following extensive debridement, the testicle was not managed immediately. Later on extra mobility of testicle resulted in testicular torsion, and finally orchiectomy was necessary. Relocation of testicles into thigh pouches rather than reconstruction of the scrotum with skin grafting in selected cases of Fournier's gangrene with significant scrotal involvement potentially offer a variety of advantages to the patient. This technique avoids the risks of additional surgical procedures. In addition to the psychological benefit to the patient, the dual function of spermatogenesis and hormonal production can only be preserved by adequately covering the exposed testes.[12,13] It also offers protection of the testicles from infection and torsion that may occur if the testes sit outside the scrotum awaiting further surgical reconstruction [Figure-4].

Thigh pouch surgery decreases the overall number of surgeries and the cost for patient management. Finally, the thigh pouch technique can be performed by a trained surgeon and does not need involvement of the plastic surgery team for grafting. This technique can be advantageous in rural areas in developing countries where highly

trained specialty services may not be readily available. We believe that our experience supports the use of the thigh pouch as a permanent reconstructive strategy in patients who have severe comorbidities or those who prefer not to undergo future extensive reconstructive procedures involving stepwise and multi-stage surgical procedures with higher treatment costs.

We acknowledge both local and split thickness skin grafts serve as excellent reconstructive strategies for many patients and this technique will not be feasible if the thigh skin or the entire scrotum were involved in the gangrenous process; however, we believe that in higher-risk patients with significant surgical comorbidities and in institutions lacking highly specialized surgical and medical services, relocation of the testes to the thigh pouch is a viable long-term reconstructive option.

Strength of the study: This is a prospective study

Limitations of this study:

- 1) The fact that testicular function was not assessed by measuring serum testosterone and semen values
- 2) Our data lacks uniform follow-up for clinic visits and ultrasound or CT imaging in patients undergoing thigh pouch reconstruction
- 3) Other possible drawback to our method includes the risk of thigh pouch infection, namely, myositis and myonecrosis. This has been documented by others and attributed to residual infection in the testes. [15,16]
- 4) Further studies with longer follow up are necessary to confirm our primary.

Conclusion

Temporary repositioning of testicles into thigh pouches following surgical debridement in patients with Fournier's gangrene in addition to offering short-term advantages and facilitating wound management and healing, may be considered as an acceptable long term surgical solution, especially in patients with poor baseline medical condition. Regular follow-up with ultrasonography and occasional serial serum testosterone measurements is needed for younger patients, if they choose thigh pouch as a long-term option.

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