

Research Article

Reconstruction of soft tissue defects in Fournier's gangrene at a tertiary care centre

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ABSTRACT

Background: Fournier's gangrene is an acute and potentially lethal multi-bacterial necrotizing infection that primarily involves the scrotum but may extend beyond its confines to perineum and abdominal wall. The disease may result in sepsis and death if treatment is delayed. Management consists of timely diagnosis, aggressive debridement, broad-spectrum antibiotics followed by reconstruction which still remains a surgical challenge.

Methods: It is a prospective study conducted from Jan 2006 to Dec 2015 on 29 patients of Fournier's gangrene who were referred to the department of Plastic and Reconstructive Surgery, Sheri-Kashmir Institute of Medical Sciences, Srinagar, Kashmir, for reconstruction after initial debridement by general surgeon/urologist. The patient's age, predisposing factors, site and the size of the defects, reconstructive options used and outcome were evaluated. Assessment of testicular function was done at 6 months by sperm count and morphology.

Results: A total of 29 patients of Fournier's gangrene consisting of 28 males and one female were included in the study. The mean age was 37 years and the most common comorbidity was diabetes mellitus in 18 patients (62%). Wounds were allowed to heal by secondary intention in 8 patients. Scrotal advancement flap was done in seven patients. Split thickness skin grafting (STSG) of extensive wounds was done in 11 patients and testes were placed in medial thigh subcutaneous pocket in one patient. Two elderly diabetic patients succumbed to sepsis and multi organ failure. Overall complication rate was 18.5%.

Conclusions: Thorough debridement and early wound cover are essential in the management of Fournier's gangrene for successful rehabilitation. Various reconstructive options are available with no conclusive evidence to support flap rather than skin graft and most of the procedures result in preservation of testicular function in the long term.

Keywords: Fournier's gangrene, Wounds, Reconstruction, Skin graft, Flap

INTRODUCTION

Fournier's gangrene which is a rapidly progressing and potentially lethal necrotizing fasciitis involving skin and soft tissues of scrotum, perineum and abdominal wall (Figure 1), was first described by Jean Alfred Fournier in 1883.¹ There are three characteristic findings of this syndrome according to Fournier: sudden onset in young males, progresses rapidly and no specific etiologic agent.²

The commonest predisposing factor is diabetes mellitus although 25% of the cases still remain idiopathic.³ The urogenital and colorectal diseases are the most common sources of infection. Men are most commonly involved though some authors have reported female involvement also.⁴ The treatment consists of broad spectrum antibiotics, surgical debridement followed by reconstruction. The aim of reconstruction is to achieve a

stable and aesthetic cover. There is no general consensus on the best method of reconstruction.



Figure 1: Fournier's gangrene involving skin and soft tissues of scrotum, perineum and abdominal wall.

METHODS

It is a prospective study conducted from Jan 2006 to Dec 2015 on 29 patients of Fournier's gangrene who were referred to the department of Plastic and Reconstructive Surgery, Sheri-kashmir institute of medical sciences, Srinagar, Kashmir, for reconstruction after initial debridement by general surgeon/urologist. Two patients died because of sepsis and multi organ failure. Patients were put on broad spectrum antibiotics initially followed by culture specific antibiotics. Repeat surgical debridement was done wherever necessary.

Wound care consisted of dilute betadine soaked gauze dressings or negative pressure wound therapy (NPWT). The frequency of moist gauze dressing was twice a day, while as the NPWT was changed after every 48 hours or earlier where deemed necessary. Wounds were optimized to healthy granulating bed.



Figure 2: Wound involving perineum and abdominal wall following debridement of necrotic tissue.

The management consisted of healing by secondary intention, split thickness skin graft (Figure 2, 3), scrotal advancement flaps (Figure 4-6) and placement of testes in medial subcutaneous thigh pockets. The patient demographics, comorbidities, site and size of defects, reconstructive procedures, outcome and complications were evaluated. The testicular function of all the male

patients was assessed after 6 months of successful wound closure by sperm count and morphology.



Figure 3: Reconstruction by split thickness skin graft.

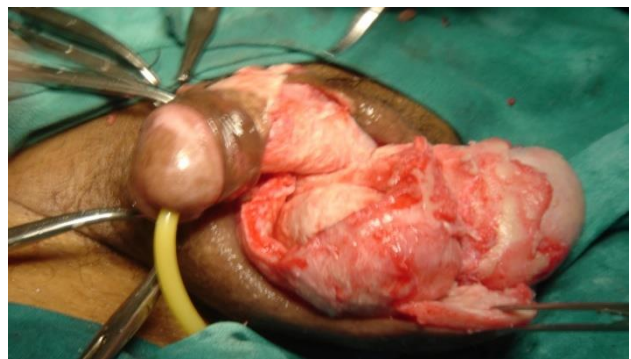


Figure 4: Large wound involving hemiscrotum and part of penis.



Figure 5: Scrotal advancement flap reconstruction frontal view.



Figure 6: Scrotal advancement flap reconstruction lateral view.

RESULTS

A total of 29 patients of Fournier’s gangrene were managed in our department during these ten years; of these 28 were male and one female. The age of patients ranged from 22 to 65 years with a mean of 37 years. The most common comorbidity was diabetes mellitus in 18 patients (62%); most common presenting symptoms were fever in 26 patients (89.7%) followed by skin changes in 21 patients (72.4%) and pus discharge in 19 patients (65%). All the patients underwent surgical debridement of necrotic tissue. Repeat debridement was required in 16 patients (55%). Two elderly diabetic patients succumbed to sepsis and multi organ failure on 5th and 7th days of admission respectively. Polymicrobial infections were seen in 18 patients (62%) while as single organism was found in 11 patients (38%).

The defects primarily involved the scrotum in 25 patients, scrotum and part of penile shaft in 1 patient, scrotum and groin in two patients and labia and abdominal wall in one patient. The size of the defect ranged from 3x2 cm to 20x15 cm, with a mean size of 6x5 cm (Table 1). Wound care consisted of dilute betadine soaked gauze dressings in 21 patients and negative pressure wound therapy (NPWT) in six patients. The decision for the reconstructive procedure was taken according to the location, size of defect, availability of local tissue and patient concerns. Wounds in eight patients were managed with healing by secondary intension. Scrotal advancement flap was done in seven patients. Split thickness skin grafting of extensive wounds (involving more than half of the scrotum or areas beyond the scrotum to groin and abdominal wall) was done in 11 patients and testes were placed in medial thigh subcutaneous pockets in one patient (Table 2).

Table 1: Distribution of patients according to the wound size.

Size of wound	No. of patients
Small wounds (<25% of scrotal involved)	7
Medium sized wounds (<50% of scrotum involved)	9
Large wounds (>50% of scrotum involved)	10
Very large wounds (involving perineum, abdomen and groin)	3

Table 2: Reconstruction options employed.

Procedure	No. of patients
Healing by secondary intention	8
STSG	11
Scrotal advancement flap	7
Medial thigh pocket	1

Complications were encountered in 5 patients (18.5%) (Table 3). Second wound coverage procedures in the

form of STSG were required in three patients. Sperm count and morphology at 6 months was found normal in 22 patients. One patient aged 65 years who had undergone grafting, one patient with medial thigh pocket aged 61 years and another patient who had undergone healing by secondary intention were found to have sub-optimal sperm count and morphology.

Table 3: Complications encounters.

Complication	No. of patients
Partial graft loss	2
Total graft loss	1
Partial flap necrosis	1
Wound dehiscence	1

DISCUSSION

Fournier’s gangrene is an extensive debilitating necrotizing fasciitis of scrotum, perineum and adjoining tissues with high mortality rate. Mortality can be reduced by timely diagnosis, use of broad spectrum antibiotics and early surgical debridement.^{5,6} It usually affects older patients with associated comorbidities most commonly diabetes mellitus, uremia, malignancy and urological diseases and as such these patients are high risk candidates for extensive surgical procedures more so under general anaesthesia.⁷ Age of the patients in our study ranged from 22 to 65 years with a mean age of 37 years. We saw a trend towards involvement of middle aged patients as compared to elderly patients as reported in literature.⁷

The aims of reconstruction are optimal cosmetic and functional results.⁷ Wound care till formal reconstruction consists of wet gauze dressings, serial debridement and vacuum assisted closure (VAC) dressings.⁸ In the present study 21 patients were managed by moist, dilute betadine-saline dressings while as NPWT was utilized for wound optimization in six patients.

Reconstruction of scrotal and perineal defects in cases of Fournier’s gangrene is a challenging task especially due to the unique color, texture and contour of the tissues involved which are difficult to recreate. Small wounds can be allowed to heal by secondary intention if they involve less than 50% of the scrotum.^{9,10} The disadvantages consist of prolonged healing time, contracture and deformity; though it may be utilized as procedure of choice for small defects in very high risk patients. We could manage eight small wounds by secondary intention successfully.

Split thickness skin graft is a relatively simple, safe, easy and versatile technique for reconstruction of a wound of any size.¹¹ The thin skin resembles normal scrotal skin, the color and shape are matching and the testicular function is preserved as the testes remain cool.⁷ We managed eleven patients with large and very large wounds involving more than 50% of the scrotum and

those with involvement of adjoining perineum and abdominal wall by STSG. One patient had total graft loss in which re-grafting was done. Partial graft loss was encountered in two patients out of whom one patient required re-grafting and one patient was managed conservatively (healing by secondary intention). The disadvantages of skin grafting include scar contracture, graft loss over uneven wound surfaces and chances of breakdown.¹²

The scrotal advancement flap follows the principle of “replace like with like”.^{3,7} It is based on the stretchable characteristics of scrotal skin which allow extensive scrotal wounds to be reconstructed by thorough undermining and advancement. As little as one-third of residual scrotum can be stretched to resurface the entire scrotum.¹³ Excessive undermining and suturing under tension, however, may lead to flap loss or wound edge necrosis.³ This flap is technically easy with less donor site morbidity and other complications.^{6,14,15} We were able to manage 7 patients with medium sized wounds with scrotal advancement flaps and encountered partial flap loss in one case which required STSG later.

Testes were buried in bilateral medial thigh pockets in an elderly patient with severe comorbidities. It is a simple method with low complication rate but is unacceptable cosmetically and functionally in young patients due to the concerns of temperature regulation, psychological effects and potential for pain.^{16,17} However, our patient was comorbid, elderly with a large defect who had already completed his family and refused to give consent for grafting.

Majority of the male patients (22 out of 26 (84.6%)), were having good testicular function at six months as documented by their normal sperm count and morphology. Four patients in our study had suboptimal testicular function at six months. Most of them were elderly. Impaired temperature control might have deranged their testicular function secondary to scar contracture (post grafting and healing by secondary intention) and relatively higher temperature in medial thigh pockets. Besides pre-morbid sperm count of these patients was not known and might have been impaired beforehand.

CONCLUSION

Fournier’s gangrene is a debilitating necrotizing infection involving scrotum, perineum and adjoining abdominal wall. Outcome depends on early diagnosis, aggressive debridement and timely reconstruction. The choice of technique depends upon the site, extent of the defect and general condition of the patient. Skin grafting should be used for defects involving more than 50% of the scrotum and those extending beyond the confines of the scrotum while defects confined to less than 50% of the scrotum can be allowed to heal by secondary intention or can be reconstructed by scrotal advancement flaps.

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