FOURNIER'S GANGRENE: MANAGEMENT EXPERIENCE OF 39 CASES

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ABSTRACT

Objective: To determine the clinical presentation and management outcome of Fournier's gangrene.

Methodology: This descriptive case series was carried out at the Department of Urology, Lady Reading Hospital, Peshawar over a 5-years period. All patients with Fournier's gangrene were included. The socio-demographic profile of the patients, area of involvement, underlying co-morbids, survival versus death, length of hospital stay and various surgical procedures undertaken were all recorded on a proforma.

Results: Out of 39 patients, 89.74% (n=35) were males while 10.25% (n=4) were females. The age range was 17-63 years with a mean of 46.20 ±13.32 years. Poor general health/ malnutrition in 82.05% patients (n=32) was the commonest underlying cause. Scrotum (n=35; 89.74%) was the most frequently involved body area. The hospital stay was 7-63 days with a mean of 33.46 ±13.79 days. The interventions undertaken included serial radical debridements (n=39; 100%), split thickness skin grafts (n=19; 48.71%), direct closure of scrotal defects (n=9; 23.07%) and flaps (n=4; 10.25%). There were 07 mortalities (17.94%).

Conclusion: Fournier's gangrene causes significant morbidity, hospitalization and mortality in our population. Necrotizing fasciitis of the scrotum or perineum is the usual presentation. Aggressive resuscitation and surgical excision of the dead tissues followed by meticulous care of the surviving patient renders the resultant defects manageable with skin grafts and flaps.

Key Words: Fournier's gangrene, Vacuum assisted closure, Skin graft

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INTRODUCTION

Fournier's gangrene is an aggressive soft-tissue infection that often leads to significant loss of skin and subcutaneous tissue in the perineal region. This acute fulminating necrotizing infection usually inflicts individuals with compromised immunity secondary to a variety of conditions. For instance those with severe nutritional deficiencies, immunosuppressant therapy, diabetes, inflammatory conditions of the perineum, urinary incontinence, fecal contamination and poor hygienic status. It is usually rapidly progressive and potentially fatal[1-3].

This disastrous condition results from mixed aerobic and anaerobic bacterial infection. The compromised immunity of the host provides a favourable flourishing environment for the bacteria to initiate the infection and rapidly promote the spread of the disease. Owing to the polymicrobial nature of the infection, the causative bacteria act synergistically to produce a variety of enzymes which promote their rapid multiplication as well as dramatic spread of the infection along the various tissue planes. The organisms involved are the usual bacterial flora of the perineal skin. Among these, the common microbes are the anaerobic species, bacteriodes, clostridial species and streptococci[4,5].

Fournier's gangrene is a serious condition of grave prognosis. The outcome depends not only on the severity of the illness and a variety of host characteristics but more importantly on the adequacy of appropriately instituted supportive and surgical management[6].

In Fournier's gangrene, typically only the scrotum is involved initially, which if left untreated results in spread of the fasciitis that culminates in exposure of the testes. The presentation is usually of sudden onset. One hallmark feature is the very irritating odour that emanates from the affected wounds. The inflammatory process can rapidly spread to involve the entire scrotum, penile skin, pubic area and the anterior abdominal wall as far as the clavicle[7-10] .

Fournier's gangrene afflicts our population. Majority of our patients present in the late stage. The present study was carried out to document its presentation and management outcome among our patients.

METHODOLOGY

It was a descriptive case series. It was undertaken at the Department of Urology, Lady Reading Hospital, Peshawar over a period of 5-years spanning from January 01, 2012 to December 31, 2016. All patients of either gender and all ages who presented with Fournier's gangrene and were managed at our department were included in the study. Exclusion criteria included patients who refused consent to be part of the study. Written informed consent was taken. The study protocol conformed to the Declaration of Helsinki of 1975, as revised in 2013. We ensured anonymity of the recruited patients.

Initial evaluation was made by history, physical examination and all ancillary investigations. Blood complete picture with differential counts, serum electrolytes, urea, creatinine, blood glucose, arterial blood gases, blood cultures, urine cultures, coagulation profile, serum fibrinogen, FDPs (fibrin degradation product) levels, tissue cultures of the wound for microbial growth and quantitative bacterial counts. The laboratory risk indicator for necrotizing fasciitis (LRINEC) score was measured by performing CRP (C-reactive protein) levels, total white cell count, haemoglobin level, serum sodium, serum creatinine and blood glucose levels. (Table 1)

All the patients were hospitalized and were aggressively managed for Fournier's gangrene. Large bore intravenous cannulae and Foley catheter was passed at presentation among all patients. Aggressive resuscitation was done to restore fluid and electrolyte balance. Blood transfusions were done where indicated. Broad spectrum antibiotics (i.e. triple therapy with third generation cephalosporins, metronidazole and penicillin) were started empirically. Diabetes mellitus and any other underlying co-morbid condition was treated as per standard protocols.

Urgent serial radical excisions of the dead tissues were performed followed by application of vacuum assisted closure (VAC) dressings which were changed every third day and continued for 2-3 weeks. Once the wounds had a quantitative bacterial count of $<10^5$ organisms per gram of tissue, definitive reconstruction with split thickness skin grafts (STSG) or flaps was undertaken. The patients were discharged home upon complete recovery with further regular follow up for three months.

The socio-demographic profile of the patients, anatomic site of involvement and any underlying co-morbidities were recorded. For the purpose of the study, the economic status of the patients was categorized as poor (if the average monthly income of the family was <Rs.15,000), satisfactory (if the income was >Rs.15,000 to Rs. 50,000) and good if it was >Rs. 50,000. The outcome measures recorded were the LRINEC score at presentation (i.e. the laboratory risk indicator for necrotizing fasciitis), survival versus in-hospital mortality, hospital stay and the frequency of the various excisional and subsequent reconstructive procedures instituted. A proforma was employed for data collection.

Figures 1 through 4(c) show the representative pictures of some of the patients included in this case series. SPSS (Statistical package for social sciences) version 17 was employed for analyzing the data. Descriptive statistics were calculated for study variables.

RESULTS

A total of 39 patients were included in the study. Out of these, 89.74% (n=35) were males while 10.25% (n=4) were females. The patients ranged in age from 17 years to 63 years with a mean age 46.20 ±13.32 years. The condition was significantly more frequent among patients with age over 40 years (74.35%; n=29) than those with less than 40 years age (25.64%; n=15) (p value <0.001).

The underlying causes included poor general health/ malnutrition among 82.05% patients (n=32), uncontrolled diabetes mellitus among 33.33% patients (n=13), and post renal transplant immuno-suppression among 7.69% patients (n=3). Economically, majority of the patients were poor (n=31; 79.48%), followed by satisfactory (n=5: 12.82%) and good (n=3; 7.69%).

The body areas affected included scrotum (n=35; 89.74%), penis (n=13; 33.33%), pubic area/ lower abdomen (n=7; 17.94%) and perineum/labia (n=4; 10.25%).

Of the microbial growths of the wound biopsies, none yielded monobacterial isolates whereas all were polybacterial growths. There were three organisms grown among 32 patients (82.02%), four organisms were cultured among three patients (7.69%) and five organisms were grown among four patients (10.25%). The organisms cultured included varying percentages of clostridia, E.coli, Klebsiella pneumonia, bacteroides, corynebacteria, enterobacter, Staphylococcal species, streptococci and Pseudomonas aeruginosa.

All the patients (n=39; 100%) presented with high fever, prostration, painful swelling of scrotum/ perineum and skin necrosis. The LRINEC score at presentation was >8 in 58.97% patients (n=23), 8 in 28.20% patients (n=11), 7 in 7.69% patients (n=3) and 6 in 5.12% patients (n=2). The length of hospital stay ranged from 7 days to 63 days with a mean of 33.46 ±13.79 days.

The various interventional procedures undertaken

included serial radical debridements among all patients (n=39; 100%), followed by meshed split thickness skin grafts (n=19; 48.71%), direct closure of scrotal defects (n=9; 23.07%) and various flaps for reconstructing large defects (n=4; 10.25%). There were seven mortalities in this case series, constituting an overall mortality rate of 17.94%.

DISCUSSION

Fournier's gangrene is a sinister infection that predominantly inflicts our adult male population particularly those aged over 40 years. More frequent involvement of adult males has also been reported by most of the published literature[1-3].

In our series, majority of the patients presented

Table 1: The laboratory risk indicator for necrotizing fasciitis (LRINEC) score

Variable, Units	Score
C-Reactive Protein, mg/L	
<150	0
≥150	4
Total White Cell Count, mm3	
<15000	0
15000–25000	1
>25000	2
Haemoglobin, g/dL	
>13.5	0
11–13.5	1
<11	2
Sodium, meq/L	
≥135	0
<135	2
Creatanine, µmol/L	
≤141	0
>141	2
Glucose, mmol/L	
≤10	0
>10	1

Figure 1: Fournier's gangrene in a lady with uncontrolled diabetes mellitus, demonstrating characteristic involvement of the female perineum and genitalia

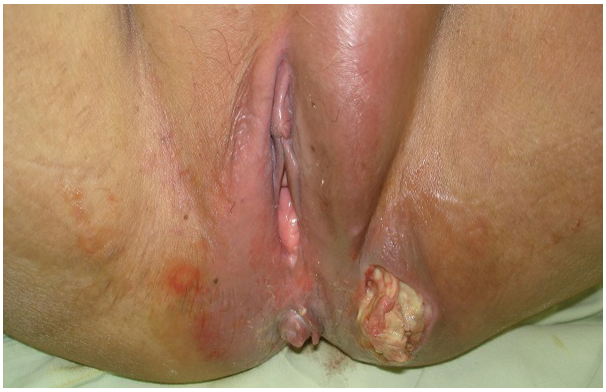


Figure 2 (a): Fournier's gangrene in a male patient demonstrating characteristic exposure of the testes

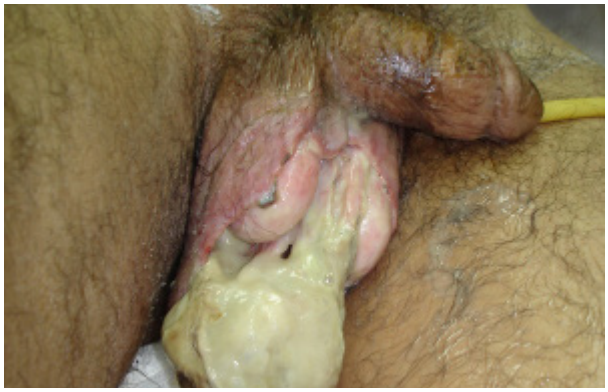


Figure 2 (b): Same patient as in figure 2(a) following serial radical debridements and VAC dressings rendering the wound suitable to be closed directly

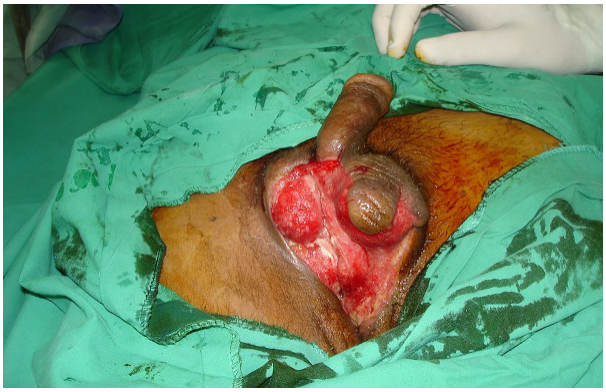


Figure 2 (c): Same patient as in figures 2(a & b), the scrotal wound was closed directly

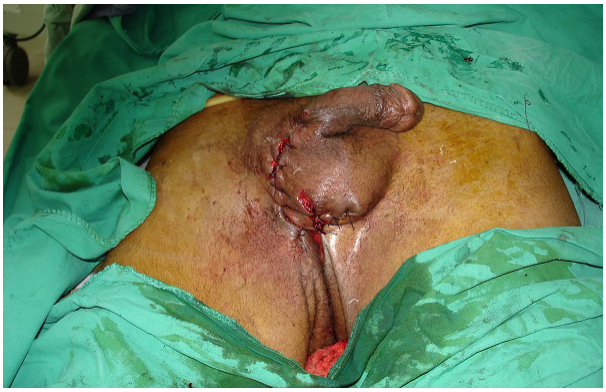


Figure 3 (a): Young patient with Fournier's gangrene with typical loss of the skin cover of the testes and penis. Serial radical debridements and VAC dressings have rendered the wounds graftable

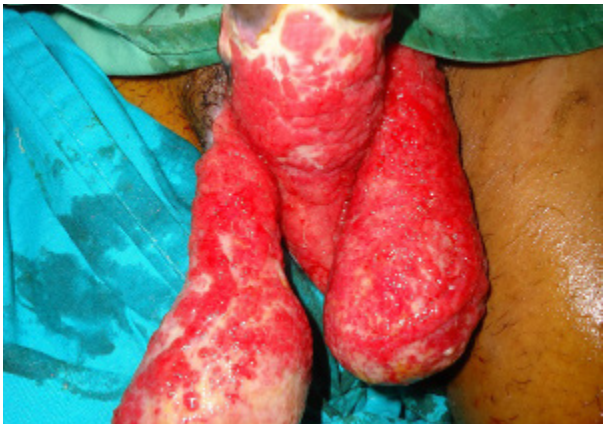


Figure 3 (b): Same patient as in figure 3(a), wounds ready for skin grafting.

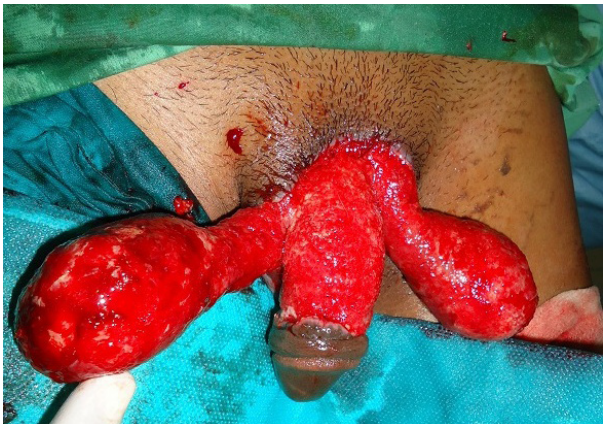


Figure 3 (c): Same patient as in figures 3(a & b), the penis was grafted with a sheet of thick STSG to prevent secondary contracture of the graft and hence shortening of the phallus. The testes were grafted with meshed STSG to allow any exudates to egress

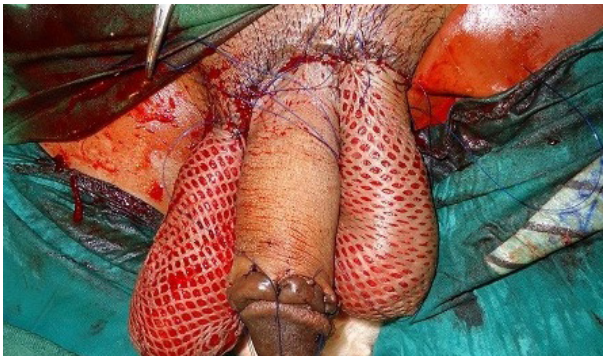


Figure 3 (d): Same patient as in figures 3(a, b & c) on 5th postoperative day with 100% take of the grafts on penis and testes

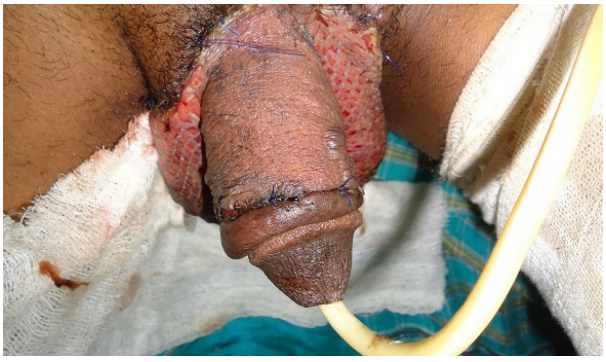


Figure 4 (a): Elderly male with Fournier's gangrene involving scrotum, penis, pubic area and adjacent lower abdomen

Figure 4 (b): Same patient as in figure 4(a), following radical excision, the wound was initially managed with several VAC dressings

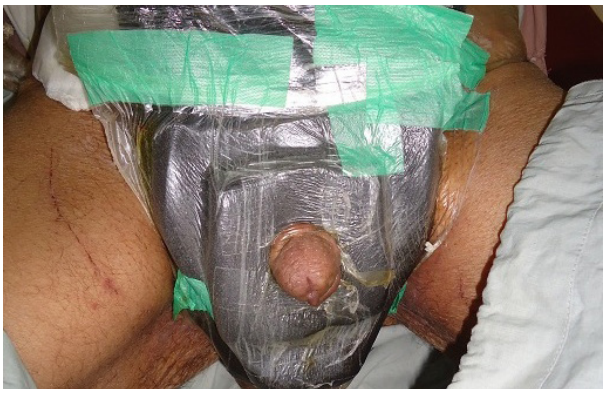
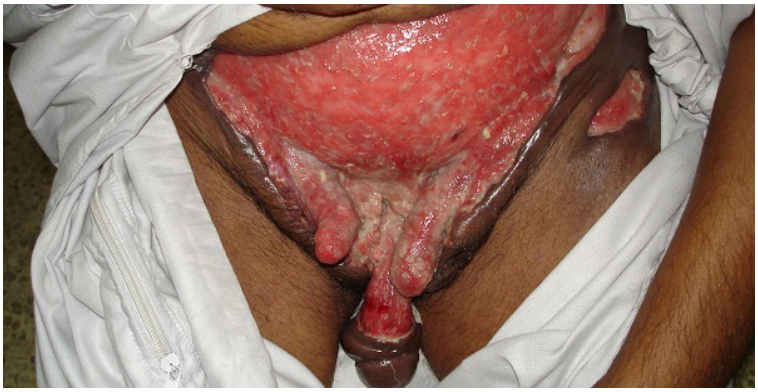


Figure 4 (c): Same patient as in figures 4(a & b), some granulation tissues have started appearing following two VAC dressings each for three days duration



acutely with various toxic signs and symptoms. Among these included high grade fever, prostration, painful swelling of the scrotal area, skin erythema and various perineal wounds.

In our study we employed the LRINEC score as a diagnostic tool and found it very useful. We found that a score of 8 or more is diagnostic of the condition while a score of 6 should prompt a strong suspicion of it. Our observations conform to most of the published literature[11-13].

Majority of our patients had underlying malnutrition and belonged to the poor socioeconomic segment of the population. The peer reviewed literature on Fournier's gangrene has outlined a variety of predisposing factors. For instance immune-compromise, diabetes mellitus, severe malnutrition, alcohol addiction, extremes of age, underlying malignancy, steroid therapy and HIV/AIDS infection. In fact any condition with impaired immunity may predispose to the development of Fournier gangrene. In the West, the emergence of HIV-AIDS into epidemic proportions has exposed a huge population at risk for developing Fournier's gangrene[1-3,5,7].

Among all our male patients, we encountered loss of the skin and subcutaneous tissue of the scrotum with variable involvement of other perineal structures. When the testicular defects involved over 50% surface area of the scrotum, we employed meshed STSGs for coverage. In fact in Fournier's gangrene, the testicular skin sloughs off, however actual testicular involvement usually does not occur owing to the presence of separate blood supply to the testes[14]. The tunica vaginalis is often intact and hence skin graft take is usually good once the wound bed has been suitably prepared for skin grafting. Eke N[15] in his review of a large population of patients pointed out that the testicular involvement signifies a possible retroperitoneal or intra-abdominal source of infection among these patients. We performed orchidectomy in none of our patients, however Ayan et al[16] in their study performed orchidectomy more frequently among their patients.

We observed loss of penile skin in 33.33% of our patients. We managed the penile defects with sheets

of thick STSGs. In fact, similar to the testes, the penis typically loses its skin cover while the corpora are usually spared. Thrombosis of the corpus spongiosum and cavernosum is very rare[17].

Following early and aggressive serial debridements of all the nonviable tissues, we employed vacuum assisted closure (VAC) dressings among all patients. The VAC therapy is of considerable help in managing these difficult wounds. It promotes tissue healing. It removes exudates, edema fluid and bacteria from the wound, converts the open wound into a controlled wound, stimulates vascularization, and prevents further bacterial infection of the wound Our current favourable experience with VAC therapy conforms to many of the published studies[18-20].

We did primary closure of scrotal wounds if the gangrene spared upto 50% of the scrotal skin. In the remainder of the patients we employed meshed split thickness skin graft (STSG) as our workhorse reconstructive tool. In the published literature STSG is the most favoured method for scrotal reconstruction and coverage of the exposed testes. The testes may be sutured together in the midline to reduce the surface area of the wound and facilitate closure. The meshed STSGs conform to the irregular surfaces of these defects quite well. The graft take is typically 100%, provided there is a well-vascularized recipient bed and intact tunica vaginalis.

In addition to the STSGs, the coverage of exposed testicles may also be performed by using medial thigh pockets. This latter method involves elevation of the medial thigh flaps from the two thighs and suturing them together in the midline. The superficial nature of the flaps protects the testes from the elevated abdominal temperatures that can adversely affect spermatogenesis. Understandably there must be soft tissues of sufficient laxity in the medial thighs for this procedure to be effective. These flaps provide adequate coverage but may produce significant contour deformity. This then necessitates a revisional reconstruction. This subsequent coverage is provided by a variety of flaps such as the vertical rectus abdominus myocutaneous flap (VRAM flap), gracilis muscle, or myocutaneous flap, the posterior thigh flap and pudendal thigh flap[21,22] .

In our study we encountered seven mortalities. Eke N[15] in an exhaustive review of 1726 cases of Fournier's gangrene reported 16% mortality whereas Pawłowski et al[23] reported a mortality rate of 20%–30%.

We did not employ hyperbaric oxygen therapy (HBO) in our patients owing to the non availability of this modality at our hospital. Some published studies[23,24] have however highlighted its role as a very useful adjunct in managing these patients. The HBO therapy has direct bactericidal effects on clostridial species while bacteriostatic effects on pseudomonas species.

LIMITATIONS

The strengths and limitations of our study are as follows. The study spanned over a reasonable period of time and encompassed large case volume. Among the limitations include the descriptive nature of the study, its being based on a single centre data and the short follow up period of three months.

CONCLUSION

Fournier's gangrene constitutes a source of significant morbidity, hospitalization and mortality in our population. It frequently affects the middle aged males aged over 40 years. Acute severe systemic illness with high grade fever, prostration and necrotizing fasciitis of the scrotum or perineum is the usual presentation among our patients. Aggressive resuscitation and urgent surgical excision of the dead tissues followed by meticulous care of the patient renders the resultant defects manageable with skin grafts and flaps. Despite our best efforts there was a mortality rate of 17.94% in our patients.

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CONTRIBUTORS

I conceived and designed the format of the study and collected the data. IU, QI and MS performed the literature search and participated significantly in the analysis and interpretation of the results. All the authors participated in writing the manuscript. All of them critically reviewed, refined and approved the manuscript. All authors contributed significantly to the submitted manuscript.