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Original Research Article

Clinical characteristics and management outcomes of Fournier's gangrene: a 9-year experience at University of Port Harcourt Teaching Hospital, Choba, Nigeria

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ABSTRACT

Background: Fournier's gangrene (FG) is a rapidly progressive, life-threatening necrotizing fasciitis primarily affecting the perineal, genital, and perianal regions. Despite advances in medical care, it remains associated with high morbidity and mortality, especially in resource-limited settings. This study evaluates the clinical characteristics, management strategies, and outcomes of FG at a tertiary care facility in South-South Nigeria using Narayan's Grading System for severity assessment.
Methods: A retrospective review was conducted on 32 male patients treated for FG at the University of Port Harcourt Teaching Hospital between 2013 and 2022. Data on demographics, predisposing factors, disease extent, treatment modalities, and outcomes were collected. Narayan's Grading System was applied to assess disease severity. Statistical analysis evaluated associations between clinical variables and outcomes.
Results: The mean age was 49.7 years. About 25% had predisposing factors, including diabetes and HIV infection. Disease involvement ranged from localized scrotal gangrene to extensive perineal and abdominal wall involvement. All patients received broad-spectrum antibiotics and surgical debridement. The overall mortality rate was 18.8%. Delayed presentation and higher Narayan wound grades were significantly associated with longer healing times. No statistically significant correlation between wound grade and mortality was observed.
Conclusions: Early diagnosis and aggressive management, guided by Narayan's Grading System, are crucial in improving outcomes in Fournier's gangrene, particularly in low-resource settings where delayed presentation is common. Increased awareness and prompt intervention may reduce the morbidity and mortality associated with this severe condition.

Keywords: Fournier's gangrene, Mortality, Narayan's grading system, Necrotizing fasciitis, Nigeria perineal infection, Surgical debridement

INTRODUCTION

Fournier's Gangrene (FG) is a severe necrotizing fasciitis of the perineal and genital regions, characterized by rapid progression and significant risk to life if not promptly addressed.[1,2] Initially described by Jean Alfred Fournier in 1883 as a spontaneous and idiopathic condition in otherwise healthy young men, FG is now understood to affect individuals across a broad age range, typically with an identifiable infectious source.[3,4] Common predisposing factors include perirectal and periurethral infections, urinary extravasation, diabetes, immunosuppression, and obesity, all of which contribute to the disease's aggressive nature. Despite advancements in treatment and diagnostic

technologies, the mortality rate remains alarmingly high, ranging between 3% and 67%.[5,6]

The management of FG hinges on early diagnosis and a multidisciplinary approach. Clinical diagnosis is often sufficient, but imaging and histopathological investigations can help define the extent of tissue involvement.[2] Treatment typically involves hemodynamic stabilization, broad-spectrum antibiotics, and extensive surgical debridement to remove necrotic tissue. Additional supportive measures, such as hyperbaric oxygen therapy (HBO), vacuum-assisted closure (VAC), and fecal or urinary diversions, are employed based on the severity and contamination of the affected areas.[4,7]

Several scoring systems have been developed to better classify disease severity and guide treatment. Among these, Narayan's Grading System is particularly noteworthy and will serve as the primary evaluative tool in this study. Narayan's grading categorizes FG severity into stages based on clinical findings, laboratory parameters, and tissue involvement. This classification system offers a structured approach for assessing disease progression and predicting outcomes, enabling healthcare providers to tailor interventions appropriately. Higher Narayan grades are associated with increased mortality risk, emphasizing the need for aggressive intervention in advanced cases.[7]

The outcomes of FG vary significantly across regions. Mortality rates in Africa are reported to be lower than those in more resource-rich areas like North America, despite limited technological support.[5,6] This study seeks to expand existing literature by leveraging Narayan's Grading System to evaluate clinical characteristics, treatment strategies, and outcomes in patients with FG at a tertiary care facility in the University of Port Harcourt Teaching Hospital, South-South Nigeria. Through this approach, the study aims to contribute meaningful insights into the management of this life-threatening condition.

METHODS

This retrospective study was conducted at the University of Port Harcourt Teaching Hospital, Choba, Rivers State, Nigeria. Retrospectively, medical records of patients diagnosed and treated for Fournier's Gangrene (FG) from January 2013 to December 2022 were reviewed. Data were collected from the surgical emergency unit, urology ward registers, and operative theatre records.

Patients with complete clinical records were included, while those with incomplete data or who left against medical advice were excluded. A total of 32 patients met the inclusion criteria. Collected data included demographic details, predisposing factors, mortality, risk variables, time to presentation, length of hospital stay, and time to healing. Additional variables included etiological factors, sites of involvement, Treatment, and severity of FG assessed using Narayan's Grading System.

Narayan's Grading System classifies the severity of FG as follows: Grade I: Involvement limited to the scrotum or labia majora, Grade II: Extension to the penoscrotal junction or both the labia majora and labia minora, Grade III: Involvement of the scrotum and penile skin or both labia and the mons pubis, Grade IV: Involvement extending to the perianal and perineal areas, with or without scrotal or labial involvement, and Grade V: Involvement of the lower abdominal wall, with or without testicular involvement.

This grading system was utilized to assess the extent and severity of FG in each patient, informing the analysis of clinical characteristics and treatment outcomes. Data were analyzed using SPSS version 29, with descriptive statistics used to summarize patient characteristics, clinical findings, and outcomes. Comparative analyses were conducted to identify factors associated with disease severity and mortality.

RESULTS

This is a review of 32 cases of Fournier's gangrene seen at the University of Port Harcourt Teaching Hospital (UPTH) in the period 2013-2022. All the patients were males with a mean age of 49.7±15.9 years, with a range of 2-78 years; see Table 1.

Table 1: Age category of patients.

Age category* in years	Frequency (%)
<30	4 (12.5)
31-40	6 (18.8)
41-50	9 (28.1)
51-60	5 (15.6)
>60	8 (25.0)

*Mean age of 49.7±15.9 years, with a range of 2-78 years

Table 2: Predisposing factors in patients with Fournier's gangrene.

Pre-disposing factor	Frequency (%)
Diabetes miletus	3 (9.4)
HIV	3 (9.4)
Metastatic prostate cancer	1 (3.1)
Anal cancer	1 (3.1)

Eight (9.4%) patients were found with a predisposing factor or evidence of immunosuppression, as shown in Table 2; where 3 patients (9.4%) had a prior history of diabetes and 3 (9.4%) had HIV, with 1 (3.1%) case of metastatic prostate cancer and 1 (3.1%) case of anal cancer. Most of the patients did not have a predisposing systemic risk factor, as only 8 (9.4%) patients were found without a predisposing factor or evidence of immunosuppression, as shown in Table 2; where 3

patients (9.4%) had a prior history of diabetes and 3 (9.4%) had HIV, with 1 (3.1%) case of metastatic prostate cancer and 1 (3.1%) case of anal cancer.

From available records in the retrospectively reviewed cases, the most common etiological factors were surgery 2 (6.3%), ischiorectal abscess 2 (6.3%), and urethral stricture 2 (6.3%); as shown in Table 3.

Table 3: Etiological factors in patients with Fournier's gangrene.

Etiological factor	Frequency (%)
Ischiorectal abscess	2 (6.3)
Urethral stricture	2 (6.3)
Anal fistula	1 (3.1)
Surgery	2 (6.3)

The extent of gangrene was variable; it ranged from the scrotum only in 21 (65.6%) patients [as shown in Table 4]. The other sites involved were penoscrotal (n=5, 15.6%), scroto-perineal (n=4, 12.5%), penile with extensive groin involvement (n=1, 3.1%) and one of the patients with scroto-perineal gangrene also had extensive abdominal wall involvement (n=1, 3.1%).

Table 4: Site of involvement with Fournier's gangrene.

Site	Frequency (%)
Scrotum alone	21 (65.6)
Penoscrotal	5 (15.6)
Scrotoperineal	4 (12.5)
Penile with extensive groin involvement	1 (3.1)
Scrotoperineal gangrene also had extensive abdominal involvement	1 (3.1)

The grade of wound according to the Narayan's grading system in Fournier's gangrene is shown in Table 5.

Table 5: Wound grading of Fournier's gangrene.

Wound grading	Frequency (%)
Grade I	21 (65.6)
Grade II	5 (15.6)
Grade IV	4 (12.5)
Grade V	2 (6.3)

As shown in Figure 1, the median time from the onset of symptoms to presentation was 4 days, ranging from 1-28 days. The Length of Hospital Stay (LOHS) ranged from 1 day to 59 days (median: 19 days).

All the patients were treated with antibiotics, surgical debridement, and frequent wound dressings with hypertonic saline, hydrogen peroxide. All survivors received daily saline sitz baths until their wounds healed, except a sole patient who required delayed operative simple wound closure. The mortality rate of patients in this study was 18.8%, as shown in Figure 2.

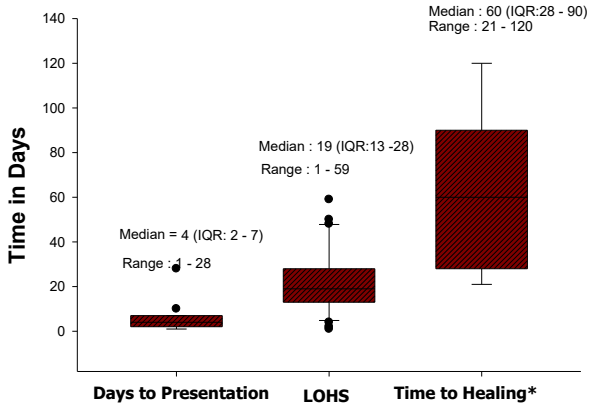

Figure 1: Days to presentation, length of hospital stays and time to healing.

*Time to Healing for Survivors

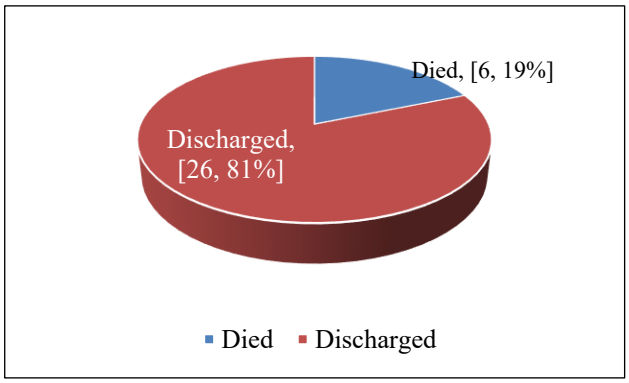

Figure 2: Mortality rate.

Association of mortality rate and risk variables

The mean age of non-survivors was 55.8 years compared with 48.3 years (p=0.302) for survivors. There was no statistically significant association between wound grading and mortality (p=0.067). The median duration of the symptoms before gangrene in the non-survivors was 3 days (Interquartile range 1-7 days compared to 5 days (Interquartile range 2-7 days) in survivors (p=0.466), as shown in Table 6.

Correlational and linear regression analysis of grade of wound and treatment management outcomes in survivors

There was a strong and statistically significant correlation between grade of wound and time to healing with σ=0.726 (p<0.0001), which implies a positive increase in time to healing with an increase in severity or extent of the wound grading score. Linear regression analysis also showed a significant increase of 12.82 days in time to healing with a unit increase in wound gradation

(p=0.014) as shown in Table 7. Also, there was a statistically significant association between days before presentation and wound grade (p=0.005).

Table 6: Association of mortality rate and risk variables.

	Mortality		P value
	Yes (n=6)	No (n=26)	
Age in years	55.8 ± 17.1	48.3 ± 15.6	0.302
Wound grading			
Grade I	2 (33.3%)	19 (73.1%	0.067
Grade II	3 (50.0%)	2 (7.7%)	
Grade IV	1 (16.7%)	3 (11.5%)	
Grade V	0 (0.0%)	2 (7.7%)	
Days before presentation	3 (IQR: 1-7)	5 (IQR: 2-7)	0.466
Length of hospital stay	15 (IQR: 10 - 32)	21 (IQR: 13 - 32.5)	0.534

Table 7: Correlational and linear regression analysis of grade of wound and treatment management outcomes in survivors.

	Spearman's Rho	Beta coefficients†
Days before presentation	0.529 (p =0.005*)	B=1.066, R^2=0.076;(p=0.176)
Length of hospital stay	0.195 (p =0.351)	B=2.536, R^2=0.053;(p=0.268)
Time to healing	0.726(p =<0.0001*)	B=12.892, R^2=0.257*;(p=0.014*)

*Statistically significant; †The use of age as a covariate did not yield any statistically significant improvement to the linear regression models

DISCUSSION

Fournier's gangrene is a critical urological emergency often presenting with advanced disease, as cases in our hospital frequently involve extensive exposure of the testes, attributed to delayed presentation and disease progression. Identifiable underlying factors, including infections, poor hygiene, and limited access to timely medical care, are commonly observed in this setting. In this study, all patients were male, highlighting a marked male predominance. This observation is consistent with findings from previous Nigerian studies, including those by Salihu et al in Northeastern Nigeria, Omisanjo et al in Lagos, and Irekpita et al in Edo State, which similarly reported a significant male preponderance, with males accounting for 98% of cases.[2,6,8] The patients had a mean age of 49.7±15.9 years, with a range of 2-78 years, which corresponds to the 51.9 years (range 24-76 years) reported in Lagos by Omisanjo et al.[6] This finding aligns with the results of earlier studies in Ibadan and South-eastern Nigeria. The relatively younger age of patients in Nigerian studies contrasts with reports from Europe and North America, where the preponderance of the patients was in the seventh and ninth decades of life.[7-10] The disparity has been attributed to the difference in life expectancy, which is relatively low in Nigeria.

All patients in this study were male in their most reproductive active years. Among them, eight patients were found with a predisposing factor or evidence of immunosuppression, including three patients (9.4%) with a prior history of diabetes, and three patients (9.4%) had HIV, with one each (3.1%) had metastatic prostate cancer and anal cancer, respectively.

In this study, most patients presented late, a trend commonly observed in similar research conducted in developing regions, such as the study by Oyelowo et al.[9.] Delayed presentation may result from initial reluctance to report issues involving the external genitalia until symptoms become severe and visible. Additionally, delays were often associated with patients seeking care from traditional healers and other unorthodox practitioners.

All patients in this study received antibiotics, serial surgical debridement, and regular wound dressings using hypertonic saline, hydrogen peroxide, and eusol. The critical role of debridement and broad-spectrum antibiotics has been similarly emphasized in other studies. While 70% of the patients had no identifiable predisposing factors, among those with risk factors, diabetes, HIV, hepatitis, and anal cancer were noted, consistent with earlier findings. Diabetes, in particular, has been reported to not only increase the incidence of Fournier's gangrene but also elevate mortality risk. Other identified risk factors include malignancy, genitourinary trauma, renal disease, and immunosuppression.

The overall mortality rate was 19%, which is higher than rates reported in other Nigerian studies, such as Aliyu et al (15.79%) and Oyelowo et al (16%).[10,9] However, the smaller sample size and shorter study duration in this research may account for the higher mortality observed. The mean age of non-survivors was 55.8 years compared to 48.3 years for survivors, although the difference was not statistically significant (p=0.302). Consistent with previous studies, increasing age was associated with higher mortality rates.

The study found no statistically significant association between wound grading and mortality (p=0.067). The shorter median symptom duration before the onset of gangrene in non-survivors (3 days; interquartile range 1-7 days) likely reflects the rapid and aggressive progression of the disease in these patients, leading to quicker deterioration of health compared to survivors (5 days; interquartile range 2-7 days). Other factors linked to increased mortality include Fournier's Gangrene Severity Index (FGSI) scores >9, longer hospital stays, septicaemia or septic shock, abdominal extension of gangrene, and abnormal haematocrit or serum potassium levels.

A significant correlation was observed between wound grade and time to healing, indicating that more severe wounds required longer healing durations. Linear regression analysis showed a significant increase of 12.82 days in healing time for each unit increase in wound grade (p=0.014), as detailed in Table 7. The delay in seeking care was associated with more severe wound grades (p=0.005), indicating that longer wait times before presentation correlate with worse disease severity.

CONCLUSION

FG is a devastating urological emergency with a significant mortality rate. Timely intervention with broad-spectrum antibiotics and early serial debridement remains critical to successful management. Also, identification of both local and systemic predisposing factors is essential for tailoring treatment plans and improving outcomes. Adequate initial in-hospital education and supervision of wound care shortens hospital stay, time to healing, and may obviate the need for operative wound closure. These steps remain crucial, especially in low-resource settings where Fournier's gangrene abounds.

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