ORIGINAL ARTICLE

Prognostic Factors and Outcome of Treatment in Patients With Fournier's Gangrene in a Tertiary Institution in Nigeria.

EA Obiesie, AME Nwofor, CK Oranusi, TU Mbaeri, OO Mbonu

Department of Surgery, Nnamdi Azikiwe University Awka, Nnewi Campus Nigeria.

Abstract

Objective: Fournier's gangrene is an extreme life threatening Urological condition. The objective of this study was to identify the prognostic factors and outcome of treatment in patients with Fournier's gangrene in a tertiary institution in South East Nigeria. **Methodology**: This was a prospective study of 21 (twenty one) male patients diagnosed with Fournier's gangrene in our hospital, from June 2012 to June 2019. History and comprehensive physical examination as well as resuscitatory measures were commenced at the emergency units and continued through the wards. Laboratory investigations were conducted. Patients were assessed using Fournier's gangrene severity index scoring system FGSI. Extent of tissue involvement was assessed during debridement within 24 hours of presentation. Definitive treatment measures were commenced, and patients followed up till discharge. Performance status at discharge was assessed. Data generated were analysed using SPSS version 23 (IBM STATISTICS) **Results:** The mean age of the patients was 56years ± 13.3 (range of 22 to 78years). The peak age incidence was in the 60th decade. The commonest systemic predisposing factor was diabetes mellitus (23.8%) as a single independent etiologic factor, and 71.4% in combination with other systemic predisposing factors. Two patients (9.5%) were obese, diabetic, and presented with anal abscess. No systemic predisposing factor was identified in 4 patients (19.1%). Four patients (19.1%) had bladder outlet obstruction secondary to urethral stricture disease, and has had attempts at urethral catheterization. Four patients (19.1%) had ischio-rectal abscess, while two patients (9.5%) had scrotal injuries from trauma. Fever, malodorous scrotal swelling, anaemia and shock were the common clinical features. Scrotal gangrene was seen in 10 patients (47.6%), scroto-perineal gangrene in 6 patients (28.5%), scroto-abdominal gangrene in 4 patients (19.1%), while only one patient (4.8%) had scroto-penile gangrene. The mean FGSI score at presentation was 7.0 ± 4.0. The mean hospital stay was 52 days ± 45 (range 3 - 210 days). Following debridement, the testes were exposed in 12 patients. Mean performance status at discharge was 1.4. Three mortalities were recorded, and all had diabetic ketoacidosis with mean FGSI score of 10 at presentation. **Conclusion:** Complicated diabetes mellitus and poor FGSI scores are major predictors of mortality in patients with Fournier's gangrene. Proper and aggressive management protocol gives good outcome.

Key Words: Fournier's gangrene, prognostic factors, treatment-outcome.

Introduction

Fournier's gangrene is a life threatening urological condition, characterised by rapidly spreading necrotising fascitis of the perineum and external genitalia. It is a fulminant polymicrobial infection, with risk of death from organ failure[1].

Necrotizing fasciitis in the region of the perineum and genitalia clearly describes this disease[2]. Majority of Fournier's gangrene patients suffer from a

Address for Correspondence:

Dr EA Obiesie
Department of Surgery, Nnamdi
Azikiwe University Awka, Nnewi
Campus Nigeria
E-mail: ea.obiesie@unizik.edu.ng

combination of predisposing factors[1]. Diabetes mellitus, chronic alcoholism, malignancies / immunosuppressive states, bladder outlet obstruction with UTI, liver and kidney diseases are established predisposing factors[3,4]. The pathological features of this disease, as well as portal of entry of causative organisms are well defined[5]. A mixed growth of gram negative rods, aerobic gram positive cocci and anaerobes, with Escherichia coli as the most common isolate have been implicated in the infective aetiology of this disease[6]. The incidence of Fournier's gangrene and mortality rate have been on the rise in some contemporary series[7,8].

This may be due to increasing mean age of populations, and rising number of immune-suppressed patients, or patients on immunosuppressive therapy[9,10]. Diagnosis is often clinical, while investigations help to evaluate the patient's status and possible predisposing factors that will be useful in determining severity and planning patient's management. The Fournier's gangrene severity index scoring system (FGSI) has been considered as a good predictive tool in the prognosis of this disease[11,12]. The FGSI is based on deviation from reference ranges of nine (9) parameters viz temperature, heart rate, respiratory rate, white blood cell count, hematocrit, serum sodium, serum potassium, serum creatinine and serum bicarbonate. Each parameter is assigned a score between 0 and 4. An FGSI score greater than 9 correlated with increased mortality[12]. Proper and aggressive treatment protocol remain essential adjuncts for management of this condition. Our study aimed at identifying the prognostic factors, and outcome of treatment in patients diagnosed with Fournier's gangrene.

Methodology

This was a prospective study of all patients presenting at the Accident & Emergency Unit/ urology clinic of Nnamdi Azikiwe University Teaching Hospital Nnewi with symptoms and signs diagnosed as Fournier's gangrene during the study period from June 2012 to June 2019.

They were enrolled into the study at presentation, after obtaining consents. Data collected, included biodata, presenting symptoms, co-morbidities and predisposing factors.

A comprehensive physical examination with particular attention to the external genitalia and perineum were done, and resuscitatory measures instituted for each patient depending on condition. The following investigations were carried out; urinalysis, urine microscopy, culture and sensitivity, full blood count, serum electrolyte, urea and creatinine, fasting blood sugar and radiological investigations.

They were repeated as necessary, and at the end of treatment. The assessment of extent of tissue involvement was done during debridement in theatre after stabilization, but within 24 hours of presentation. Patients were subsequently scored using FGSI. These patients were followed up from admission till discharge. We identified the Fournier's Gangrene Severity Index (FGSI) scores of the patients at presentation, the performance status at discharge, as well as the correlation between FGSI of survivors, and scores of patients that died from the disease.

Our treatment protocol involved resuscitation, triple antibiotics regimen, tetanus prophylaxis, prompt and aggressive /serial debridement. This is usually followed by serial and sustained wound dressing with dilute hydrogen peroxide/ H2O2 soaked gauze; normal saline/ soaked honey or 10% povidone iodine.

Data obtained, were analysed using SPSS Version 20 and subjected to linear regression. The results were expressed using tables and charts. Pearson's correlation was used to assess correlation.

Results

All the patients were males, with mean age of 56 years ± 13.3 (range of 22 to 78 years). The youngest was a 22 year old boy with urethral stricture disease. The age range with the highest incidence was 50 to 59 years. The mean age of survivors was 48.7 years, and that for non survivors was 71 years.

The common clinical features were fever, malodorous scrotal swelling, anemia and shock.

The predisposing factors are shown in table 1.

The commonest predisposing factor was diabetes mellitus in 15 patients (71.4%). Six patients (28.6%) had anal conditions, while four (19.1%) had urethral stricture disease. Two patients (9.5%) were obese, while four (19.1%) had no predisposing factor.

The commonest cultured organism was Eschericea coli (52.4%), followed by Staphylococcus aureus (19.1%), while no organism was cultured in one patient. Details are shown in figure 2.

Table 1: Predisposing Factors in the pathogenesis of Fournier's gangrene

Aetiology	Frequency	Percentage (%)
Diabetes Mellitus (DM)	5	23.8
DM + Anal Abscess	4	19.1
Idiopathic	4	19.1
DM + Obesity + Anal Abscess	2	9.5
DM + Scrotal Injury	2	9.5
DM + BOO + Urethral Stricture Disease	2	9.5
BOO secondary to Urethral Stricture Disease	2	9.5
Total	**21**	**100**

Table 2: Cultured Organisms

Cultured Organism	Frequency	Percentage (%)
Coliform	11	52.4
S. Aureus	4	19.0
Klebsiella	3	14.3
Pseudomonas	2	9.5
No culture	1	4.8

The mean duration of symptoms at presentation was 9 days (range 1 to 21 days). Scrotal gangrene was seen in all the patients in varying degrees and with extension to the perineum in 6 (28.5%) patients (fig 4), to the lower abdomen in 4 (19.1%) and one (4.8%) extended to the penis and left thigh (fig 3). It should be noted that primary sites for all was the scrotum. The overall mean FGSI score at presentation was 7.0±4.0 (range 2 to 16).

The mean FGSI score for survivors was 6.8 ± 2.7, while non-survivors had a mean of 10.0 ± 5.3. Three mortalities were recorded. Two of them were obese, diabetic and died within 7 days of admission. Two had diabetic keto-acidosis DKA, and all three were admitted with a mean FGSI score of 10 at presentation. The mean hospital stay was 52 days±45 (range 3-120 days) with performance status of 1.4 (ECOG) at discharge.
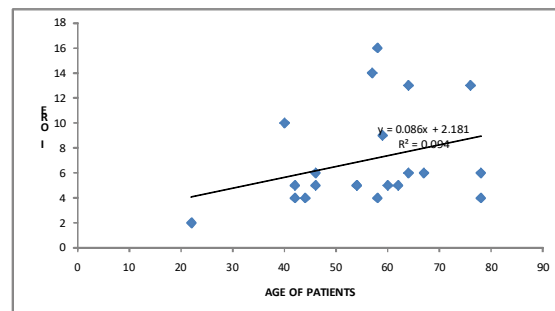
Table 3: Severity of scores (FGSI)

FGSI Score	Frequency	Percentage (%)
0-3	1	4.8
4-7	14	66.6
8-11	2	9.5
12-15	3	14.3
16-19	1	4.8

Majority of patients (66.6%) had FGSI scores

Table 4: Correlation Test

		FGSI (S)	FGSI (NS)
FGSI(S)	Pearson Correlation	1	0-997*
	Sig. (1-tailed)		0.024
	N	18	3
FGSI(D)	Pearson Correlation	0.997*	1
	Sig. (1-tailed)	0.024	
	N	3	3

*Correlation is significant at the 0.05 level (1-tailed).

r= +0.306 {moderate positive correlation}
Figure 1: Scatter Plot of FGSI vs Age of all Patients.

between 4-7. Few patients (28.6%) had FGSI scores between 8-19. Making use of the regression coefficient y=a+bx, where y is FGSI score, a is intercept, b is slope and x is age of patient, it can be seen that the average FGSI score becomes 2.18 when the age is 0. The impact on FGSI score per unit increase in age is 0.09. This observation is statistically significant.

Figure 2: Fournier's gangrene at presentation in A&E

Figure 3: Fournier's gangrene following debridement, antibiotics and serial wound dressing.

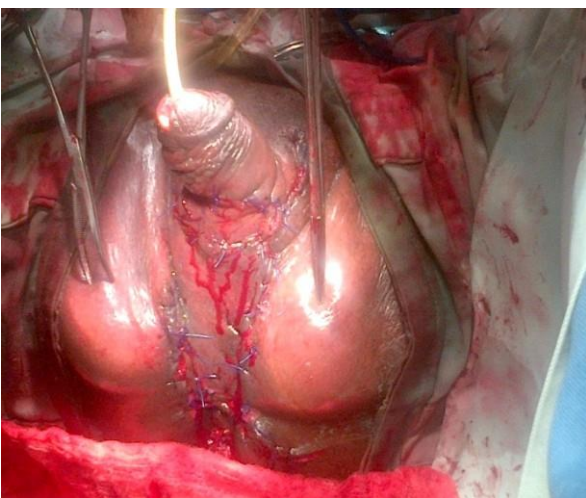**Figure 4:** Fournier's gangrene with anal abscess.

Figure 5: Closed Post Fournier's gangrene wound.

Discussion

Fournier's gangrene is a severe urological emergency that requires aggressive management to prevent mortality. Prediction of survivors has always been difficult especially in more severe cases

Previous studies on this topic have been retrospective, with incomplete data retrieved mostly from case notes making it difficult to prognosticate on the outcome [5,7,9,10,13]. The mean age of our patients was 56 years ±13.3 (range 22-78 years). Previous studies done in Nigeria revealed younger mean age[10]. Aliyu et al[13] in UMTH recorded this disease in a 2 week old baby. The pathology of Fournier's gangrene has been established to arise from reduced cellular immunity leading to suppurative bacterial infection. The subcutaneous vessels are thrombosed . The combination of these two processes cause gangrene of overlying skin[14]. E. coli as found in our study is the commonest isolated organism. However, this could be as a result of the commensal nature of these organisms in the perineal region[15].

The mean age identified by Ugwumba et al[10] in Enugu South East Nigeria was 48.3 years (range 28-66years), with a peak age incidence of 50-59 years. This was similar to our findings.

The age of survivors in our study, differed significantly from that of non-survivors (48.7 vs 71 years), p=0.002 . In figure 1, making use of the regression coefficient y=a+bx, where y is FGSI score, a is intercept, b is slope and x is age of patient, it can be seen that the average FGSI score becomes 2.18 when the age is 0. The impact on FGSI score per unit increase in age is 0.09. This observation is statistically significant. In a regressing order, most deranged parameters in the scoring system were: serum urea, respiratory rate, bicarbonate, heart rate, temperature, white cell count, serum potassium, sodium, and creatinine . However, dehydration may have accounted for elevated urea, without corresponding elevation in creatinine

Diabetes mellitus, with or without local complications ranked as the major systemic predisposing factor, 71.4% of cases (n=15). None of our patients was sero-positive for HIV. This is contrary to the findings in other studies [13,16]. There were no predisposing factors established in 19.1% of cases (n=4). This corroborates the fact that idiopathic aetiologic factors still exist, and in variance with some findings in literature that suggest that an aetiologic agent must be identified in all cases[16].

Necrotizing fasciitis in diabetic patients is usually extensive and could result from trivial injuries to the scrotum as was identified in two patients following

shaving of pubic hairs.In our study, two patients with diabetes were admitted unconscious, and they never regained consciousness till death. The third mortality had a pelvic abscess and was incontinent of faeces. He susquently had a diverting colostomy and suprapubic cystostomy. Despite multi-disciplinary management, he died from severe sepsis. Urinary and faecal diversions correlate with extent of necrosis which have an adverse effect on treatment outcome[17]. The mean FGSI score was greater than 10 for these non-survivors, with a mortality rate of 14.3%. Omer et al[18] recorded a mortality rate of 20.5% in Ankara, while Aliyu[13] and Ugwumba et al[10] recorded rates of 15.8% and 3.6% respectively[10-13]. In the work by Laor et al[19], when 9 points was taken as the cut-off score, patients with FGSI score >9 died with a likelihood of 75%, and they survived with a likelihood of 78% when score was $\leq$ 9. Most surviving patients in our study were younger, had an average FGSI of 6.8 and non was obese. Obesity and diabetes mellitus have been established to lower immunity[20]. Among the cases of diabetes mellitus, complicated by a local predisposing factor, anal abscess (26%) was a major risk factor. Obesity with anal abscess, urethral stricture disease and scrotal injuries accounted for the rest. These findings suggest the different patho-physiologic mechanisms of the disease.

In our experience,despite the FGSI score on admission, prompt assessment & resuscitation, good choice of broad spectrum antibiotics, immediate debridement in theatre, follow up serial debridement and wound dressing were important adjuncts to wound healing and survival. The choice of wound closure is determined by the extent of tissue loss and resultant defect following debridement and dressing.

Conclusion

Complicated diabetes mellitus, obesity, old age and poor FGSI score are major predictors of mortality in patients with Fournier's gangrene. Proper and aggressive treatment protocol gives good outcome. Mortality is less than values of 25% recorded in most urology texts and literature.

Recommendation

All patients with Fournier's gangrene should have risk assessment on presentation at the accident and emergency units. Obese, patients with high FGSI score on presentation, elderly and diabetic patients are very high risk patients, and will benefit from prompt & coordinated multi-disciplinary management.

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