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Fournier's Gangrene: A Review of Fournier's Gangrene Severity Index (FGSI) and Other Predictors of Mortality

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Abstract

Background: Fournier gangrene is an acute and rapidly progressive necrotizing fasciitis of the scrotum, perianal and perineal region of the body. It is a polymicrobial infection having an interplay of both anaerobic and aerobic orgasms in a soup of microbial disaster. Fournier's gangrene was also initially thought to be an idiopathic condition but a lot of risk factors have been associated now with this condition, both systemic risk factors and local. Systemic risk factors include diabetes mellitus, HIV/AIDS, cancers, chronic liver disease, chronic steroid use etc. The local risk factors include perineal injuries, watering can perineum, perianal abscess, chronic perineal itching etc. **Purpose:** The swiftly flourishing bacteria orgasms cause a similar disruptive event in the body of the patients both clinically and biochemically and these can be used to create a predictive score or index for patients in order to assess the disease severity and guide in the management and prognostication of this condition. **Materials and Method:** Urology ward record books, clinic record books and operating theater records were used to identify patients managed for Fournier gangrene in ATBUTH Bauchi. A retrospective study of the medical files of all the patients managed from January 2011 to January 2024 was done. Folders were retrieved and the medical records were reviewed. **Results:** Of the 50 patients reviewed, Male to female ratio is 24:1. The mean age is 56 years (2 weeks to 97 years). Mortality rate was 34%. There is a significant difference between delayed presentation/initial use of unorthodox treatment with mortality ($p = 0.002$). Of the 17 patients that died, 15 had FGSI > 9 and of the 33 patients that survived 29 had FGSI < 9, thus the mortality rate for those with FGSI > 9 is 88.2% while the mortality rate for those with FGSI < 9 is 12.1%, and the statistical difference was significant ($p = 0.001$). All the mortalities had more than one microorganism isolated (polymicrobial). The

mortality rate for polymicrobial is 48% while that for monomicrobial is 0%. The difference was significant (p = 0.001). **Conclusion:** knowledge of the predictors of its mortality is necessary in other to help stratify patients and ensure the best response by the caregivers. FGSI, delayed presentation/initial patronage of unorthodox care, and polymicrobial infection are important predictors of mortality in this condition.

Keywords

Fournier's, Gangrene, FGSI, Risk Factors, Mortality

1. Introduction

Fournier's gangrene is a urologic emergency, a highly lethal polymicrobial necrotizing fasciitis of the scrotal and perineal region [1]. The nidus of infection is the most commonly from the gastrointestinal and genitourinary tract coming from perineal or genital injuries. Trauma to the genitalia can cause a breach in the structural integrity of the epithelial cover or urethral mucosa which can start the subsequent event leading to the infectious process [2] [3]. There are also some systemic comorbidities that have been related to Fournier's gangrene which include diabetes mellitus, HIV/AIDS, chronic alcoholism, extreme ages, malignancies, malnutrition and other conditions with decreased cellular immunity [4] [5]. In theory, any condition that can lead to a decrease in cellular immunity of a patient can predispose that patient to Fournier's gangrene [2]. In malnourished patients, even insect bites have predisposed to Fournier's gangrene [6].

The interplay between the compromised immunity of the patient and the virulence of the infective organism creates a symbiosis within which the infection flourishes, the tissue destruction thrives and the patient's condition worsens. The infecting organisms are usually the commensals found on the perineum, bowel and genital organs, mostly polymicrobial and the usual organisms are coliforms, klebsiella, Bacteroides fragilis, staphylococci, streptococci [7]-[9].

Although there has been tremendous progress in the field of antibiotics with very effective molecules, and despite the advancement in surgical techniques and methods of wound care and debridement, with state-of-the-art intensive care units. Fournier's gangrene has still defied all odds and maintains high morbidity and mortality [3] [8] [10].

Diagnosis of Fournier's gangrene is mainly clinical, and although clinical presentations may vary from patients to patients, the common features include scrotal pain, tender dark lesion on the scrotum, crepitation, fever, foul smelling scrotal discharge, and tarchycardia [10] [11].

Imaging can also be useful in diagnosis, although this can cause delay in diagnosis, nevertheless they are useful adjuncts both in diagnosis and prognostication of the condition [12].

There are also laboratory features that are useful in risk identification for the condition, otherwise known as the laboratory risk indicators for necrotizing fasciitis (LRINEC) [13].

With the morbidity and mortality of this condition still very significant, it is important to have a form of prognostication for this condition, which will aid in patient stratification and resource allocation for the patient, most especially in resource poor countries and also help in patient and patient relative counselling after diagnosis of this condition. Here, we are looking at our experience with Fournier's gangrene severity score and other laboratory parameters' correlation with the morbidity and mortality of Fournier's gangrene.

2. Methodology

Urology ward record books, clinic record books and operating theater records were used to identify patients managed for Fournier gangrene in ATBUTH Bauchi. A retrospective study of medical files of all the patients managed from January 2011 to January 2024 was done, folders were retrieved and the medical records were reviewed. The data of each patient was collected in detail, including information on the patient biodata and demographics, presenting complaints and their duration, previous interventions done, family history, history of comorbidities, and medical history. Symptoms at presentation, general physical examination and status localis also noted and recorded. All available investigation results were also recorded for all the patients. Treatment information was also collected including surgical intervention(s).

3. Results

We located and retrieved the medical records and information of 50 patients treated for Fournier's gangrene in our facility over the duration of the period under review. Of the 50 patients, 2 (4%) are females and 48 (96%) are males giving a male-to-female ratio of 24:1. The mean age is 56 years (2 weeks to 97 years). Seventeen patients died and 33 patients survived, thus mortality rate was 34%. Eighteen patients (36%) presented within the first week of symptoms while 32 patients (64%) presented more than a week after the onset of symptoms, of the 32 patients with delayed presentation, 21 (65.6%) had tried other unorthodox treatments before presenting to the hospital, 15 (88.2%) of the 17 patients that died belonged to this group, there is a significant difference between delay presentation/initial use of unorthodox treatment with mortality ($p = 0.002$). Twenty of the patients (40%) were farmers, 27 (54%) were civil servants. The commonest presenting complaints were scrotal darkening (92%), scrotal ulceration (87%), foul-smelling scrotal discharge (57%) and fever (55%). Diabetes mellitus was the commonest co morbidity seen in 54% of the patients, followed by hypertensive heart disease in 48% of the patients, other co comorbidities includes: HIV, chronic kidney disease, and chronic liver disease. About 11% of the patients had no none co morbidity. Of the 17 patients that died, 15 had FGSI > 9

and of the 33 patients that survived 29 had FGSI < 9, thus mortality rate for those with FGSI > 9 is 88.2% while the mortality rate for those with FGSI < 9 is 12.1%, and the statistical difference was significant (p = 0.001). Microscopy, culture and sensitivity test was gotten for 43 patients and 35 (81%) of the patients had more than one microorganism isolated while only 8 (19%) patients had a single microorganism isolated, most of the microorganism were sensitive to the available antibiotics. All the mortalities had more than one microorganism isolated (polymicrobial), the mortality rate for polymicrobial is 48% while that for monomicrobial is 0%, the difference was significant (p = 0.001). It was also noted that disease progression was more rapid and fulminant among those with polymicrobial culture than their monomicrobial counterpart. The average number of debridement was 2 times, minimum of once and maximum of 6 times, more frequent numbers of debridement were seen among patients with polymicrobial infection. The commonest microorganism isolated is shown in Table 1. below. None of our patients had a diverting colostomy done, 8 patients had suprapubic cystotomy done to divert urine but no statistically significant difference (p = 0.423) between those that died and those that survived.

Table 1. Cultured microorganism.

Bacteria specie isolated	No. of isolates	%
Escherichia Coli	26	52
Staphylococcus spp.	9	18
Streptococcus spp.	6	12
Pseudomonas aeruginosa	7	14
Klebsiella pneumonia	5	10
Bacteroides fragilis	4	8
Proteus mirabilis	3	6
Enterococcus faecalis	2	4
None isolated	4	8

Note: 81% of the specimen contained more than one species of bacteria.

Significant difference was found among those patients that died and those that survived on their laboratory parameters: urea, creatinine, WBC counts (p = 0.0021), there is a large decrease in these values amongst patients responding to treatment and eventually those that survived. There was a need for blood transfusion among 20 of the patients who were eventually transfused, 13-patients were transfused more than once, but no significant difference among those that died or survived with blood transfusion (p = 0.841), there was an increase/improvement in the hematocrit level of those that respond to treatment and survived.

4. Discussion

Fournier's gangrene is a urologic emergency characterized by a fulminant and rapidly progressive necrotizing fasciitis of the scrotum and perineal skin which can extend to the lower abdominal region as a result of mostly, polymicrobial perineal infection mainly seen in patients with compromised cellular immunity.

The mean age of the patients in our study was 56 years (2 weeks - 97 years), this was similar to findings seen in Zaria [14] (north-west Nigeria), ibadan [15] and Kenya [16].

Our mortality rate was 34% which was similar to the mortality rate seen in other others too [17]-[19]. Lower mortality rates were seen in other parts of the country [14] [15] although their study duration was shorter and the patients' number reviewed was less.

The Fournier's gangrene severity index score was developed by Laor *et al.* to stratify the risk in Fournier's gangrene patients and to predict the risk of mortality amongst them, taking into account the recordings of the hospital admission parameters [19] [20]. In our study, we found a significant relationship between the FGSI score and mortality ($p = 0.001$), Of the 17 patients that died, 15 had FGSI > 9 and of the 33 patients that survived 29 had FGSI < 9, thus mortality rate for those with FGSI > 9 is 88.2% while mortality rate for those with FGSI < 9 is 12.1%, this is also similar to other studies validating the ability of FGSI score to predict mortality in Fournier's gangrene patents [19]-[23].

Disease progression in Fournier's gangrene is often rapid, leaving a wave of death and necrotic tissues in its wake. Studies have shown that delay at first debridement will subsequently affect the outcome of the condition negatively, we also found out in our study that there is a significant relationship between delay presentation, the initial patronage of unorthodox medical care and mortality. Eighteen patients (36%) presented within the first week of symptoms while 32 patients (64%) presented more than a week after the onset of symptoms, of the 32 patients with delayed presentation, 21 (65.6%) had tried other unorthodox treatments before presenting to the hospital, 15 (88.2%) of the 17 patients that died belonged to this group, there is a significant difference between delay presentation/initial use of unorthodox treatment with mortality ($p = 0.002$), this may be both due to rapid progression of the disease with delay presentation as well as the use of concoctions that may increase the burden of infection on the wound by the traditional caregivers; cow dungs and other highly infected substances have been reported to be used on wounds by unorthodox medical care givers [24]. A study carried out in Japan in which over 379 patients were seen and examined, it was found that early intervention can reduce the mortality rate in half compared with later or delayed intervention [25].

Most of the patients are farmers or civil servants representing the middle-class demographics of the region.

Microscopy, culture and sensitivity test was done for 43 patients and 35 (81%) of the patients had more than one microorganism isolated while only 8 (19%) patients had a single microorganism isolated, most of the microorganism were

sensitive to the available antibiotics which was mainly 3rd generation cephalosporin and metronidazole combination or quinolones and metronidazole combination. All the mortalities had more than one microorganism isolated (polymicrobial), the mortality rate for polymicrobial is 48% while that for monomicrobial is 0%, the difference was significant (p = 0.001). It was also noted that disease progression was more rapid and fulminant among those with polymicrobial culture than their monomicrobial counterpart, this may be a result of the synergistic interaction between the microorganisms usually between anaerobes and aerobes [3] [26] [27].

The average number of debridement was 2 times, a minimum of once and a maximum of 6 times noted in our study, this is similar to those found in the literature [9] [28]-[30] Urgent and aggressive debridement within 24 hours of presentation has been advocated for improving clinical outcome of patients with FG [2] [30].

Serial bedside debridement under analgesia and sedation can also be done and has been found to be very beneficial in infection eradication [31]. The commonest microorganism isolated were (**Table 1**) E. coli (52%), staphylococcus sp (18%), streptococcus (12%), pseudomonas (12%) and about 81% of the specimen were polymicrobial, meaning more than one organism was cultured from a wound. This is in keeping with findings gotten by Dolouglu and Kuzaka *et al.* [32] [33].

Unlike the study in Zaria [14], we have found no relationship between the level of hematocrit at presentation and the need for transfusion with mortality (p = 0.841).

It is important to reiterate that FG is a very lethal urologic emergency that prompt response, aggressive debridement and broad-spectrum antibiotics are its mainstay of treatment, although multidisciplinary approach is always best for a wholesome outcome.

5. Conclusions

Despite advances in methods of care, FG is still a lethal condition and knowledge of the predictors of its mortality is necessary in other to help stratify patients and ensure the best response by the caregivers. FGSI, delayed presentation/initial patronage of unorthodox care, and polymicrobial infection are important predictors of mortality in this condition.

A follow-up on biochemical markers such as urea and creatinine are also important predictors of mortality and patients with a significant chance at recovery show massive fall on these parameters and on white blood cell count with treatment.

There is a need for prospective randomized studies involving a larger number of patients to further validate and emphasize these findings.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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