

Predisposing Factors and Outcome of Fournier's Gangrene

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Abstract

Introduction: Fournier's gangrene (FG) is the fulminant necrotizing fasciitis of the perineum and genitalia resulting from polymicrobial infection. This disease is known to be prevalent for many centuries.

Aim: This study aims to study the predisposing factors associated with FG and its outcome.

Materials and Methods: Patients with features of necrotizing fasciitis of the perineal/genital regions were included in the study. The diagnosis was confirmed by clinical examination and detailed history regarding prior history of diabetes mellitus, hypertension, perianal sepsis, urinary retention/extravasation, trauma, and immunodeficiency states was recorded. The mortality and morbidity rates were calculated.

Results: Diabetes was the most common predisposing factor associated with FG (44.4%). *Escherichia coli* was the most common organism involved both in survivors and non-survivors group. One-third of the patients were infected with multiple species. The mortality rate encountered in our study was 15%.

Conclusion: Early recognition of the pathology and aggressive surgical debridement is the mainstays of the management of FG. Additional strategies to improve wound healing and increase patient survival are also needed.

Key words: Debridement, Fournier's gangrene, Management, Necrotizing fasciitis

INTRODUCTION

The pathologic condition, currently known as Fournier's gangrene (FG), was first described as a pathology localized to the scrotum by Jean-Alfred Fournier in 1883.^[1] According to Fournier, the disease was fulminant gangrene of the scrotum and penis seen, especially in healthy young males, and had a sudden onset and rapid progression. Data from contemporary series indicate that FG tends to affect patients with advanced age, predisposing medical conditions, and mostly an identifiable etiology.^[2] Although there are some controversial features in the description, the clinical picture of FG is typical and is a condition, usually accompanied by anaerobic or aerobic polymicrobial

infections, which begins in the genital or perineal region and rapidly spreads to the abdominal wall causing tissue gangrene. Despite the fact that knowledge regarding the etiology, diagnosis, and treatment has increased, FG retains its characteristic of pathology with high mortality rate.^[2,3]

Aim

This study aims to study the predisposing factors associated with FG and its outcome.

MATERIALS AND METHODS

All patients admitted in the General Surgical wards of Government Rajaji Hospital with the diagnosis of FG were included in the study. The study period was between September 2011 and August 2013 which is 24 months to be exact. The selection criteria used were such that patients with features of necrotizing fasciitis of the perineal/genital regions admitted during the specified time period were included in the study. Other closely resembling clinical pathologies such as torsion testis, acute/chronic epididymo-orchitis, pyocele, and urinary extravasation were excluded from the study.

Access this article online



www.ijss-sn.com

Month of Submission : 11-2019
Month of Peer Review : 12-2019
Month of Acceptance : 12-2019
Month of Publishing : 01-2020

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The diagnosis was confirmed by clinical examination and detailed history regarding the prior history of diabetes mellitus, hypertension, perianal sepsis, urinary retention/extravasation, trauma, and immunodeficiency states was recorded. Complete physical examination of the patient was done including the site, extent, and depth of the disease. Routine investigations including hemoglobin %, complete blood count, erythrocyte sedimentation rate, random blood sugar, renal function test, serum electrolytes, urine sugar and acetone (if required), pus culture, and sensitivity and screening for HIV were done as required. Broad-spectrum antibiotics were administered initially and later changed to antibiotics according to their pus culture and sensitivity. Those patients who presented with shock were initially resuscitated and then proceeded to definitive treatment, which is surgical debridement. The debridements were done on a daily basis until healthy granulation tissue was seen over the ulcer bed. After then, either the wound was allowed to heal by secondary intention or by secondary suturing or by a split skin graft or a local flap. The outcome of the patients was noted. The mortality and morbidity rates were calculated.

RESULTS

This study encompasses a total of 27 patients, all cases were male. The majority of the cases were in the age group between the 6th and 7th decades, which was about 37% (10 cases) followed by 40–50 years age group with 26% (7 cases). The disease was predominantly found to occur in the low socioeconomic status disease in the study (89%).

Diabetes mellitus holds a significant share in leading to FG in the study. It comes up to 44% (12 cases) followed by hypertension with 22% (6 cases). The other significant factors are urinary stricture with extravasation (11%) and perianal sepsis (15%). Trauma accounts for 1 case (4%). Idiopathic, i.e., no known significant factors takes up to 25% of the total [Figure 1].

Regarding the spread of the disease and its extent, perineum was most commonly involved in the study, i.e., 48% of the cases. Extension to the thighs and anterior abdominal wall was the next predominant sites with 26% and 22%, respectively. The genital organs, i.e., penis were invariably not involved in all the cases. When the disease involves the abdominal wall, the mortality rate shoots up to 67% followed by 57% when it involves thighs and 31% in cases of perineal extension [Table 1].

In this study, about 52% of the patients were admitted to the hospital after 2 days of their initial symptom. Around 19% and 11% of the patients were admitted after 1 and 3 days of their initial symptom, respectively. The

significance of these statistics is that there was absolutely no mortality in these patients. However, when the days get longer, the mortality rate rises significantly. About 7% of the patients showed themselves at the hospital after 3 days, in which the mortality rate was 50%. When the day becomes 4, there is 100% mortality rate.

The survivors group presented after a mean of 2 days of their initial symptom, whereas it was 4.75 for the non-survivors. The mean duration of hospitalization for the survivors was 37.9 while for the non-survivors group, it was 3.25 [Figure 2].

Almost 52% of the patients required a minimum of 3–5 debridements. About 19% of the patients required more than 10 debridements. The number of debridements

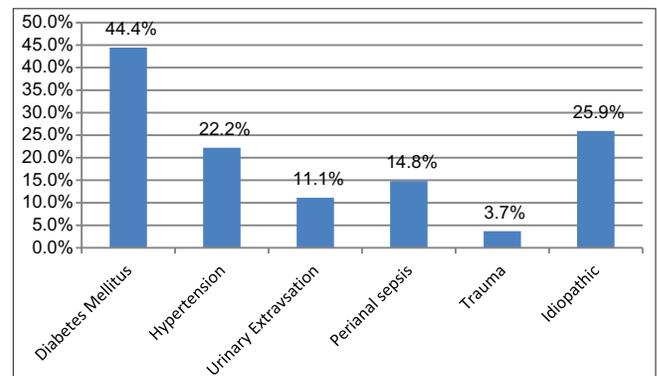


Figure 1: Distribution of patients according to predisposing factors

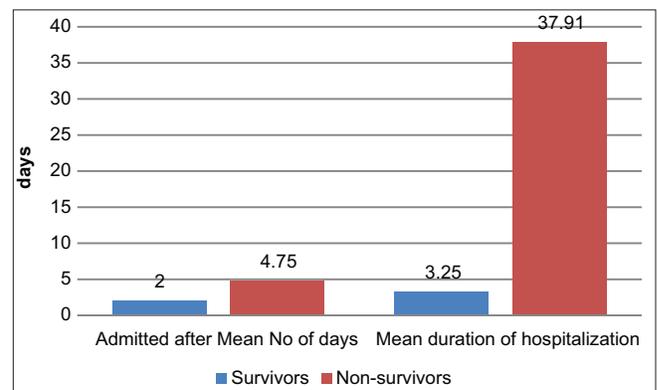


Figure 2: Mean duration of hospitalization between survivors and non-survivors

Table 1: Distribution of patients correlating the extent of spread and mortality

Extent of spread	Number of cases	Number of deaths	Mortality rate (%)
Perineum	13	4	30.77
Abdominal wall	6	4	66.67
Thighs	7	4	57.14

generally correlates with the number of days of stay in the hospital. More the number of the debridements, longer the stay in the hospital [Figure 3].

Various organisms, alone or in combination, were cultured from the wound. *Escherichia coli* ($n = 11, 40.74\%$) and *Klebsiella* ($n = 7, 25.93\%$) were the most commonly isolated bacteria. The other organisms isolated were *Staphylococcus aureus*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Streptococcus pyogenes*, and *Bacteroides* species.

Although surgical debridement and antibiotics are the principles of treatment in FG, definitive treatment after the initial step is mandatory. On discussing the various options available, 40% of the patients required split skin grafting for wound cover after the primary debridement, making it the most popular of the treatment options. About 25% of the subjects were left to heal by secondary intention, mostly because the size of the remnant wound was too small or the scrotal wound had gone in for contraction. About 18% of the subjects needed secondary suturing for the remnant wound. About 7% of the patients were subjected to a temporary proximal loop colostomy as the perineal

extension of the disease had gone into deeper planes involving the anal sphincters, leading to anal incontinence resulting in fecal soiling of the wound. These patients would later be subjected to sphincter repair and colostomy closure at a later date. Another 7% of the patients had to undergo suprapubic cystostomy due to the etiology of the FG in these cases. These were urinary extravasation resulting from urethral stricture, leading to the onset of FG.

The total number of patients in the study was 27, of which 4 patients expired and the remaining 23 were discharged. The mortality rate in the study was 15% Figure 4.

DISCUSSION

FG remains a pathological condition with high mortality. The mortality rates reported in the literature range between 3% and 45% and severe sepsis, coagulopathy, acute kidney failure, diabetic ketoacidosis, and multiple organ failure are given as the causes of the deaths.^[2,3] One of the most important factors altering the prognosis of the patient has been reported to be the extent of the area affected by the pathology.^[4] Furthermore, conditions such as advanced age, colorectal origin of the disease necessitating colostomy, and the presence of renal or hepatic failure have also been shown to be factors which adversely affect prognosis.^[2,5]

Many conditions believed to contribute to the development of the disease are diabetes mellitus, alcoholism, immunosuppression, local trauma, genitourinary infections, acquired immunodeficiency syndrome,^[6] malignant neoplasms,^[7] and liver and renal disease.^[8] In all these conditions, there was a decrease in the host immunity that determined the development of the infection. Diabetes mellitus is the most commonly associated comorbid condition (20–70%),^[9] but controversy still exists as to whether or not diabetes mellitus is associated with increased mortality. In a study by Torremadé Barreda *et al.*^[9] and Yanar *et al.*,^[10] there was no increase in the mortality in diabetic patients. In their study, Nisbet and Thompson^[11] concluded that diabetes is a risk factor for the occurrence of FG, but it does not affect the prognosis. However, if diabetes mellitus is associated with chronic alcoholism, then it carries a bad prognosis.^[12] Immunosuppression is also a very important contributing factor, especially in post-transplant patients^[13] and in patients receiving bone marrow transplantation,^[14] because in such patients, their immunosuppressive state favors bacterial, viral, and fungal infection.

In a study of 1641 males with FG (treated at 593 hospitals) by Sorensen *et al.*,^[15] increased mortality was associated with increasing patient age, four specific comorbidities (hypertension, congestive heart failure, renal failure,

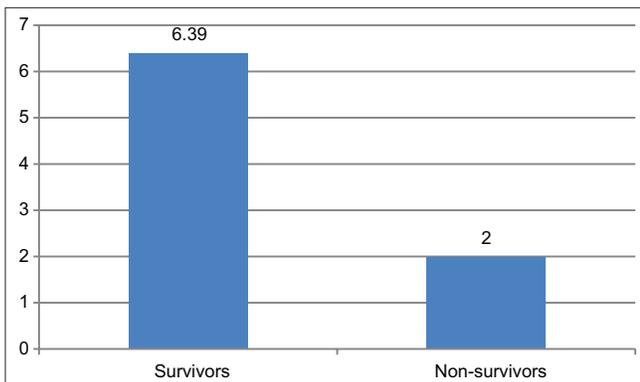


Figure 3: Distribution of debridements

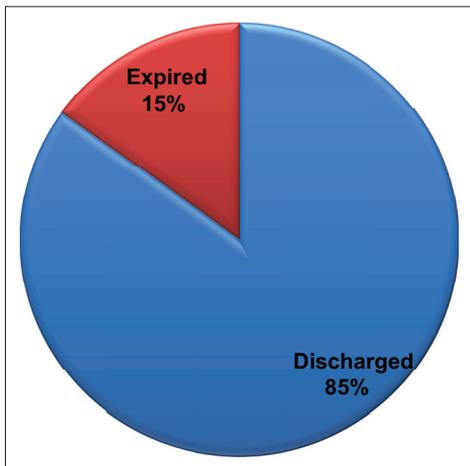


Figure 4: Distribution of outcome

and coagulopathy), certain procedures required during admission (colostomy, penectomy, mechanical ventilation, and dialysis), increased length of hospital stay, and cases presenting to urban institutions and teaching hospitals. Each operation that a patient required also increased the unadjusted odds of death by 27% (likely reflecting more severe FG). In contrast, requiring orchiectomy was associated with 70% decreased mortality risk. On the other hand, the patients' ethnicity or race and the number of surgeries did not predict mortality.

CONCLUSION

FG is a rare but severe and rapidly progressive condition with considerable morbidity and mortality, and hence, it should be treated with aggressive fluid resuscitation along with appropriate antibiotics (both local and systemic) and repeated extensive debridement of the involved area to improve survival. Since the prognosis is mainly related to early diagnosis, a high index of suspicion and early diagnosis leads to a more favorable outcome.

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How to cite this article: Anand AJ, Jebaraj KD. Predisposing Factors and Outcome of Fournier's Gangrene. *Int J Sci Stud* 2020;8(1):1-4.

Source of Support: Nil, **Conflicts of Interest:** None declared.