FOURNIER'S GANGRENE: EXPERIENCE IN A TERTIARY CARE HOSPITAL- A RETROSPECTIVE ANALYSIS OF 288 PATIENTS

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ABSTRACT

BACKGROUND

Fournier's gangrene (FG) is a rare but life-threatening disease. Although originally thought to be an idiopathic process, FG has been shown to have a predilection for patients with diabetes as well as longterm alcohol misuse; however, it can also affect patients with non-obvious immune compromise. The nidus is usually located in the genitourinary tract, lower gastrointestinal tract, or skin. FG is a mixed infection caused by both aerobic and anaerobic bacterial flora. The development and progression of the gangrene is often fulminating and can rapidly cause multiple organ failure and death. Because of potential complications, it is important to diagnose the disease process as early as possible. Although antibiotics and aggressive debridement have been broadly accepted as the standard treatment, the death rate remains high.

Aim - The purpose of this study is to highlight the aetiopathogenesis, risk factors and outcomes of Fournier's gangrene.

MATERIALS AND METHODS

A retrospective descriptive study was conducted on 288 patients of Fournier's gangrene (ICD-9 CM 608.83) from January 2013 to December 2016 at King George Hospital, Visakhapatnam, Andhra Pradesh, India. All cases who were found to have Fournier's gangrene at the time of admission were included in the study.

RESULTS

Among the total 288 patients, 280 were male (97.23%) and 8 were female (2.77%). These cases represented less than 0.02% of hospital admissions. The overall incidence was 1.6/100,000 males, which peaked in males who were 50 to 79 years old (3.3/100,000). The overall case fatality rate was 22.91% (66). Primary underlying cause leading to Fournier's gangrene is not identified in 46 (15.97%) patients, which is referred as idiopathic variety. In remaining 242 (84.03%) cases, anorectal disease is leading cause (133, 46.18%) followed by genitourinary diseases (89, 30.90%) and other identifiable aetiology in 20 (6.94%) cases. The risk factors frequently associated with Fournier's gangrene are diabetes mellitus which is observed in 171 (59.37%), chronic alcoholism in 135 (46.87%), immunosuppression due to advanced malignancy 9 (3.12) and AIDS 5 (1.73%) and other unidentifiable risk factors in 44 (15.27%). Some patients have more than one risk factor like chronic alcoholism and diabetes mellitus 77 (26.73%).

CONCLUSION

Patients with Fournier's gangrene are rarely treated at most hospitals because of lack of ICU facilities and unawareness of aetiopathogenesis. It is a very aggressive disease which needs prompt early diagnosis and aggressive management with broad spectrum antibiotics and thorough early debridement. Despite of aggressive management the mortality is still high.

KEYWORDS

Fournier's Gangrene; Mortality; Polymicrobial.

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BACKGROUND

Fournier's gangrene (FG) is a fulminant form of infective necrotising fasciitis of the perineal, genital, or perianal regions, which commonly affects men, but can also occur in women and children.^[1] Even though this clinical entity is eponymously credited to the Parisian venereologist Jean-Alfred Fournier, who described it as a fulminant gangrene of the penis and scrotum in young men,^[2] Baurienne in 1764 and Avicenna in 1877 had described the same disease earlier.^[3]

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Over the years, many terms have been used to describe this clinical condition including idiopathic gangrene of the scrotum, periurethral phlegmon, streptococcal scrotal gangrene, phagedena, and synergistic necrotising cellulitis.^[4,5] Early surgical debridement of necrotic tissues and antibiotics are fundamental in the treatment of FG. Despite advanced management mortality is still high and averages 20%–30%.^[6] In a study by Laor et al,^[7] effective important factors for survival or death were first described and then they created the Fournier's Gangrene Severity Index (FGSI) for predicting the severity of the disease (Table-1). To better understand epidemiology and outcomes in patients with Fournier's gangrene, we examined a large possible number of patients. In this study, we assessed the epidemiology, predisposing factors, effect of early debridement and mortality of Fournier's gangrene which was conducted in a tertiary care hospital.

MATERIALS AND METHODS

This retrospective descriptive study was conducted at King George Hospital (KGH) in Visakhapatnam, the capital of North Coastal Andhra Pradesh, during the calendar years 2013-2016. KGH is a 1085-bedded tertiary care hospital rendering services to the people of North Coastal Andhra Pradesh and adjacent districts of Orissa and Chhattisgarh. The hospital has a 24 hours casualty department, 20-bedded surgical intensive care unit, several open wards with capacity for around 250 surgical patients, and equipped with two emergency operating rooms.^[8] And the hospital is specially equipped with septic ward which is principally involved in management of septic cases like cellulitis, necrotising fasciitis, Fournier's gangrene and other sort of septic cases. As a tertiary care hospital and equipped with septic ward, surgical ICU and many peripheral hospitals are unable to treat the condition, our institution acted as referral institute for Fournier's gangrene.

A retrospective descriptive study of 288 patients of Fournier's gangrene was done over a period of last three years (January 2013-December 2016). The data was collected from emergency room entry registers, emergency OT registers, inpatient septic ward registers, microbiology registers and death records. All cases were studied in terms of clinical presentation, extent of disease at the time of presentation, extent of first debridement and postoperative course. Data includes gender, age, date of admission, date of surgery, date of discharge or death, date of onset, and type of symptoms, extent of disease, associated risk factors, underlying aetiology and vital signs on presentation including heart rate, blood pressure, respiratory rate, and urine output. The results of initial complete blood counts, biochemical values (creatinine, potassium, sodium and bicarbonate values) were also taken into consideration to assess the FGSI.^[7]

RESULTS

In our study of 288 Fournier's gangrene cases, 280 (97.23%) were male, 8 (2.77%) were female and we had no experience of FG in paediatric age group. This condition is predominantly observed in middle and old age population in contrast original description of Jean-Alfred Fournier, who described it as a fulminant gangrene of the penis and scrotum in young men.^[2] In our study, the prevalence of disease is predominant in 41-50 age groups (112 patients); 96 patients belonged to 51-60 age groups and 64 cases were observed in more than 60 years group. We only observed 16 cases in young population which are mostly attributed to HIV, immunosuppression in post transplantation, which are comparable with other studies.^[2,3,5,6]

There are many aetiological factors (Table- 3) observed in pathogenesis of FG. Among them FG secondary due to anorectal diseases like perianal abscess and complicated haemorrhoids are the leading cause followed by genitourinary diseases like urethral stricture, septic urethral catheterisation, septic urethral instrumentation; which are comparable with other studies^[5,6,9] Gynaecological causes and skin diseases and trauma are uncommon aetiological factors. But in some patients, despite of extensive search the primary cause could not be identified, which is referred as idiopathic variety. Primary underlying cause leading to Fournier's gangrene is not identified in 46 (15.97%) patients; idiopathic variety. In remaining 242 (84.03%) cases, anorectal disease is leading cause (133, 46.18%) followed by genitourinary diseases (89,

30.90%) and other identifiable aetiology in 20 (6.94%) cases which are comparable with other studies.^[5,6,9,10]

Temperature
Heart rate
Respiration rate
Serum sodium
Serum potassium
Serum creatinine
Packed cell volume (%)
Whole blood cell count
Serum bicarbonate

Table 1. Variables in Fournier's gangrene severity index

Diabetes
Alcohol misuse
Immunosuppression
Chemotherapy
Chronic corticosteroid use
HIV
Leukaemia
Liver disease
Debilitating illness

Table 2. Comorbid risk factors for the development of Fournier's gangrene

Urogenital
Urethral stricture
Indwelling catheter
Traumatic catheterisation
Urethral calculi
Prostatic biopsy
Vasectomy
Insertion of penile prosthesis
TVT procedure
Hydrocele aspiration
Genital piercing
Perineal trauma
Anorectal
Perianal abscess
Rectal biopsy
Anal dilatation
Haemorrhoidectomy
Rectosigmoid malignancy
Appendicitis
Diverticulitis
Gynaecological
Infected Bartholin's gland
Septic abortion
Episiotomy wound
Coital injury
Genital mutilation

Table 3. Aetiology of Fournier's gangrene

DISCUSSION

In FG, suppurative bacterial infection results in microthrombosis of the small subcutaneous vessels leading to the development of gangrene of the overlying skin.^[11] Cultures from the wounds commonly show polymicrobial infections by aerobes and anaerobes, which include coliforms, Klebsiella, streptococci, staphylococci, clostridia, Bacteroides, and corynebacterium. On an average, at least three organisms are cultured from each diagnosed patient.^[9] We also experienced similar polymicrobial cultures with predominant organism being coliforms (E.coli) followed by Bacteroides and streptococci. In our study, we have taken pus culture swabs

from wound at early stages of initial debridement followed by weekly thereafter till time of discharge. Most of these are normal commensals in the perineum and genitalia, which, because of the impaired host cellular immunity, become virulent and act synergistically to invade tissue and cause extensive damage.^[12] Even though *E. coli* have been reported to be the commonest organism isolated from the wound, it could be because of the commensal nature of these organisms in the perineal region. Anaerobes are less frequently isolated than expected, which could be because of technical faults.^[10] Rare reports of other organisms being cultured include *Candida albicans*,^[12,10] and *Lactobacillus gasseri*.^[13] We have no experience in isolation of fungal and other rare organisms. The impaired defence mechanisms in the host help the infection to proceed unchecked, and at alarming speed, along the fascial planes. The synergistic activity of aerobes and anaerobes lead to the production of various exotoxins and enzymes like collagenase, heparinase, hyaluronidase, streptokinase, and streptodornase, which aid in tissue destruction and spread of infection. The platelet aggregation and complement fixation induced by the aerobes and the heparinase and collagenase produced by the anaerobes lead to microvascular thrombosis and dermal necrosis.^[11] In addition, the phagocytic activity is impaired in the necrotic tissue, aiding in further spread of the infection.^[1]

FG shows vast heterogeneity in clinical presentation, from insidious onset and slow progression to rapid onset and fulminant course, the latter being the more common presentation.^[9,14,15] In our study, most of the cases are presented with Systemic inflammatory response syndrome and few are in septic shock at time of presentation, only few patients had indolent course in which most of them are attributed to early presentation. The infection commonly starts as cellulitis adjacent to the portal of entry, depending on the source of infection, commonly in the perineum or perianal region. The local signs and symptoms are usually dramatic with significant pain and swelling. The patient also has pronounced systemic signs; usually out of proportion to the local extent of the disease. Crepitus of the inflamed tissues is a common feature because of the presence of gas forming organisms.^[14] As the subcutaneous inflammation worsens, necrotic patches start appearing over the overlying skin and progress to extensive necrosis.^[16] Unless aggressively treated, the patient can rapidly progress to sepsis with multiple organ failure, the common cause of death in these patients.^[15] The spread of infection is along the fascial planes and is usually limited by the attachment of the Colles' fascia in the perineum. Infection can spread to involve the scrotum, penis and can spread up the anterior abdominal wall, up to the clavicle. The testes are usually spared as their blood supply originates intra-abdominally.^[17]

FG warrants an aggressive multimodal approach, which includes haemodynamic stabilisation, broad spectrum antibiotics, and surgical debridement. It must be highlighted however, that early surgical debridement is the primary component of treatment and if delayed will have a negative impact on the prognosis.^[18] All non-viable and necrotic tissue must be excised, until well perfused viable tissue is reached. The full extent of the disease may not be apparent from the areas of cutaneous involvement, which is usually less than the subcutaneous disease. Multiple surgical debridements are the

rule rather than the exception, with an average of 5 procedures required per patient which are comparable to other studies.^[19] The morbidity of FG is also high. Among them, post debridement wound around the genitals is important. For improving the fast healing and decrease the morbidity due to wound many techniques have been evolved. Various workers have used different techniques to provide skin cover including transplantation of testes in thighs, free skin grafts, axial groin flaps, and myocutaneous flaps.^[20,21] In our study, many are treated by allowing it to heal by granulation tissue followed secondary suturing. For the patients with extensive raw area exposing both testes; we implanted the testis in thighs. Split-thickness skin graft was used for the wounds over penis and with extensive raw area over anterior abdominal wall. Parkash et al reported their series of treatment of 43 cases in the past 11 years. In three cases the gangrene had spread beyond the scrotum and penis and cover had to be supplemented with split-skin grafts. In all the other cases, cover was provided with scrotal skin remnants at the edge of the lesion and on the penis with the inner layer of the prepuce, which had remained intact.^[20,21]

There are many solutions which hasten the debridement of FG wound after initial thorough debridement by its enzymatic debridement action; which ultimately reduces the quality and quantity of mechanical debridement.^[22] Among them are Eusol solutions, gels containing papain and urease enzymes. One of the best approach we noted for faster recovery of FG wound is sitz bath with Eusol solution and Luke warm water. There are many silver and collagen containing gels, dressings; derivatives of growth factors like PDGF and EDGF gels which fasten the healing of FG wound post debridement.^[22,23] With the recent advent of the vacuum assisted closure (VAC) system dressing, there seems to be a dramatic improvement with minimising skin defects and speeding tissue healing. It simply works by exposing a wound to subatmospheric pressure for an extended period to promote debridement and healing.^[24] Even though VAC has many advantages; we have limited experience with it.

Antibiotic therapy should be broad spectrum to empirically cover all possible organisms. The usual combination includes first and third generation cephalosporin, with or without an aminoglycoside, for the Gram-negative organisms, plus metronidazole for the anaerobes, the presence of a fungus or if grown in the culture, then addition of amphotericin B is necessary.^[25]

The mortality in FG is high, despite of aggressive management. In our study, mortality rate is 22.91%, a total of 66 cases among 288 which are comparable with other studies.^[1,3,25] The most common cause of mortality being multiorgan dysfunction due to septic shock followed by death due to comorbidities.

CONCLUSION

FG is still a life-threatening condition with unacceptably high death rates despite insights gained regarding the disease process. Diagnosis should be prompt with early surgical intervention, along with antibiotics and good supportive care. Radiography can be helpful when the clinical picture is not straightforward. Continued medical care in the form of a multidisciplinary approach is necessary as these patients may require reconstructive procedures in the future. Proactive management of the diabetic and immunosuppressed patients with perineal infections is of extreme importance to prevent

the development of the condition in the first instance as this condition in the presence of such comorbidities is associated with high mortality.

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