

Mini Review

# Fournier's Gangrene

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#### Abstract

Fournier's gangrene is a usually polymicrobial, necrotizing, life-threatening fasciitis of the perineal, genital and perianal region. It is a fulminant disease which can rapidly spread to the abdominal wall and cause a high mortality. It is important to diagnose the disease process as early as possible as when the tyreatment is delayed mortality rate is directly increased.

Keywords: HIV infection; Fournier's gangrene; Radiology

## Introduction

Fournier's gangrene is a usually polymicrobial, necrotizing, lifethreatening fasciitis of the perineal, genital and perianal region. It is a fulminant disease which can rapidly spread to the abdominal wall and cause a high mortality. Jean Alfred Fournier described the disease as a fulminant gangrene of the penis and scrotum in young men and the disease was attributed to his name. However the first description is known to be made by Baurienne in 1764 [1,2]. Despite advances in treatment; overall mortality remains high [3-5].

## Etiology

Fournier's gangrene was first described as an idiopathic, rapidly progressive disease. Currently it is well known that the infection is polymicrobial including both aerobic and anaerobic bacteria. Bacterial infection causes thrombosis in the small vessels of the subcutaneous tissue and the underlying factor is thrombosis of the microcirculatory bed of the superficial fascia progressing into ischemic and hypoperfusion necrosis of the fascial structures manifesting with severe endotoxicosis and development of polyorganic insufficiency [6].

Risk factors for Fournier's gangrene include diabetes, IV drug use, trauma, recent surgery, immune suppression [e.g., cirrhosis or malignancy], peripheral vascular disease, HIV infection, systemic lupus erythematosus and morbid obesity [7]. Almost in all cases; there is a decrease in host cellular immunity. These risk factors are also associated with mortality. However some authors have reported that diabetes was only a risk factor for infection but did not increase mortality [8].

# Diagnosis

Diagnosis of FG is based on clinical signs and symptoms. The infection commonly starts as a 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 [9].

Radiology is not diagnostic but is helpful in determining the extent of the infection and watching the progression or regression after treatment. CT and MRI are also useful in the early diagnosis of FG aiming the presence of gas in the subcutaneous tissue, thickening of the scrotal wall and indemnity of testes and epididymides. These techniques can also report on the cause and are useful for delineating the extent of the process [10-12].

# Prognosis

Laor et al established a prognostic index, the FGSI [Fournier's Gangrene Severity Index] to determine the severity and prognosis of the disease in their patients [10,13]. This index was validated by Yeniyol and Tuncer [10,14,15]. The parameters used in the FGSI are: temperature, heart rate, respiratory rate, serum sodium, serum potassium, serum creatinine, serum bicarbonate, haematocrit and white blood cell count. Different studies have focused on these severity scores and reported different relation ratios. Pawlowski et al reported that only temperature and haematocrit have been related with mortality In their series. Laor et al. found that patients with FGSI score >9 had a 75% probability of death, and that those with FGSIS  $\leq$  9 had a 78% probability of survival [13]. In studies by Yeniyol et al. and Ulug et al., there was a strong correlation between an FGSI score of 9 and the mortality rate  $[p \le 0.0001]$  [14,15]. Janane et al. Reported that the differences between survivors' FGSI scores and non-survivors' FGSI scores were not significant [16]. Chawla et al used this scoring system in their series of 19 patients and found that Fournier's gangrene severity index was useful in predicting survival but not length of hospital stay Fournier's gangrene: an analysis of repeated surgical debridement. [17]. Authors in general consider this scoring system as an objective and simple method that can be used clinically to evaluate therapeutic options and assess results [18].

## Management

Management of FG requires an aggressive multidiciplinary approach. The patient should first be stabilised haemodynamically. Early surgical debridement is the primary component of treatment and if delayed will have a negative impact on the prognosis. All necrotic tissue should be immediately excised. Surgery should be extended until viable tissues are seen. On the other hand; special attention should be paid not to damage healthy tissue and perform an over excision. In some cases rinary or faecal diversion may be necessary [19]. Almost always; more than one surgical intervention is required [17]. It has been shown that the time of starting surgery was directly related to mortality but number of interventions was not [17,19]. One important challenge after extended surgery is the closure of the skin defect. Skin greft is a choice for the management of skin defecets however the use of Vacuum Assisted Closure [VAC] system dressing has been reported to successfully minimise skin defects , speed tissue healing and decrease the need for skin grefting [9].

Another step of multimodal approach to FG is the antibiotic treatment. Antibiotics should be started empirically and the chosen antibiotics should be effective on gram-positive cocci, gram-negative bacilli and anaerobes. Recent studies advise the administration of third-generation cephalosporins and metronidazole, and gentamicin could be added. Also carbapenems could be preferred for a monotherapy [10,20].

Hyperbaric Oxygen Therapy [HBOT] is a recognized additional form of treatment in FG, which is officially accepted by the Undersea and Hyperbaric Medical Society . HBOT reduces the hypoxic dysfunction of leukocytes and has a direct antibacterial effect against anaerobes [4].

Mortality remains high despite agressive surgery and advaces in therapy. The causes of death in patients with FG are severe sepsis, coagulopathy, acute kidney failure, diabetic ketoacidosis and multiple organ failure. Reported mortality rates are different. Early series reported high mortality rates around 80% in one report as high as 88% [21] but more recent studies have lower rates of mortality less than 40%. Barreda et al has reported a mortality rate of 29% in their retrospective case avalysis consisting of 41 patients [10]; on the other hand Sorensen et al has reported the overall case fatality rate was 7.5% in their large retrospective analysis including 1680 patients [3]. One of the most important measures for decreasing mortality and hospital stay is the timing of surgery. Authors have shown that surgical intervention performed in the first two days for FG is significantly associated with lower mortality than delayed surgery [22].

# Conclusion

In conclusion; FG remains to be highly mortal condition despite the improvements in understanding and managing the disease. Outcome is directly related with the time for starting surgery, however although being the most important step of the treatment; surgery is not enough alone. Right antibiotic choice and sufficient supportive care is essential for a good outcome.

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