FOURNIER'S GANGRENE: REPORT OF 22 CASES AT DAMMAM MEDICAL COMPLEX

Hussain A. AL-Abkari

ABSTRACT

Objectives: The objectives of this retrospective review of a case series of Fournier's gangrene (FG) treated at Dammam Medical Complex from April 2008 to April 2015 were to evaluate the risk factors, etiology, microbiological characteristics, hospital management, and outcome for FG patients.

Materials & Methods: The author retrospectively reviewed the clinical records of 22 patients diagnosed with FG. Data collected include age, sex, etiology, associated diseases, bacteriology, treatment modalities, and outcome.

Results: Of the 22 patients, 18 were men (82%) and four were women (18%). The average age was 54.7 years (range: 38–78 years). Predisposing disorders were identified in 86% of patients, and 82% of them were diabetics. The etiology identified in patients included urogenital infections (36%) and anorectal sepsis (36%). Cutaneous and subcutaneous infections were identified in 23% of patients. One patient (5%) had perforated acute appendicitis, which developed into necrotizing fasciitis of the scrotum, right flank, and anterior abdominal wall. More than one bacterium was found in the tissue culture of 68% of patients, the most frequent being *Escherichia coli*. All patients were treated with a broad spectrum of antibiotics and urgent, aggressive surgical debridement. Wound healing by secondary intention occurred in 69% of surviving patients. Tissue reconstruction using local flaps or skin grafts was required in five patients. The overall mortality rate was 27% and was found to be higher in elderly patients.

Conclusion: FG is a rare and still potentially fatal infectious necrotizing fasciitis of the perineum and abdominal wall along the scrotum and penis in men and vulva in women. Patients at risk include the elderly and diabetics. An etiology can be identified in most cases. Early recognition and intervention with aggressive debridement, combined with antibiotics therapy, are essential for a successful outcome.

Keywords: Fournier's gangrene, infection, necrotizing fasciitis

Citation: AL-Abkari HA. Fournier's gangrene: report of 22 cases at Dammam Medical Complex. Gulf Medical Journal. 2017;6(1):27–32.

INTRODUCTION

Infective necrotizing fasciitis of the genital and perianal regions, also known as Fournier's gangrene, is a rare, life-threatening disease. The progression of the gangrene is often fulminating, and can rapidly cause multiple organ failure and death. Thrombosis of small blood vessels due to obliterating endarteritis with resultant ischemia contributes to the rapid extension of the infection. Early diagnosis with fast and adequate treatment, including aggressive surgical debridement, hemodynamic stabilization, and broad-spectrum antibiotics therapy, is the key to successful management[1]. Despite advances in the management of the disease, mortality is high at 16%[2].

The objectives of the present retrospective study were to evaluate the risk factors, etiology, microbiological characteristics, hospital management, and outcome for 22 patients with FG.

Correspondence: Dr. Hussain A. AL-Abkari (FRCS, CABS), Department of Surgery, Dammam Medical Complex; P O Box 60535, Qatif 31911, Saudi Arabia. Phone: 966-505800870. Email: huabkari@hotmail.com

MATERIALS & METHODS

The medical records of 22 patients admitted with FG at Dammam Medical Complex, Dammam, Saudi Arabia, from April 2008 to April 2015 were retrospectively reviewed. Data collected included age, sex, predisposing factors, underlying etiology, microbiology, treatment modalities, duration of hospital stay, and clinical outcome. The time elapsed between the onset of symptoms and first debridement was noted. All patients underwent radical surgical debridement. The infected, necrotic skin and subcutaneous tissues were widely excised to viable tissue. Purulent or necrotic tissue was sent to the microbiology laboratory for organism identification and antibiotics sensitivity testing.

Preoperative treatment with broad-spectrum antibiotics was started and later changed or continued according to the culture and sensitivity of the microbial isolates and clinical course of the patients.

Diverting colostomy was performed in cases with perianal wounds, which could not be appropriately managed due to constant fecal contamination.

Defects in the scrotum, perineum, and abdominal wall were reconstructed with split-thickness skin grafts or local flaps in select cases when the wound failed to heal by secondary healing.

RESULTS

Of the 22 patients, 18 were men (82%) and four were women (18%). The mean age of the patients was 54.7 years (range: 38–78 years).

Predisposing disorders were identified in 19 patients (86%); 18 (82%) had diabetes mellitus (DM). Two patients with DM also had chronic renal failure, while one had liver cirrhosis. Another diabetic patient had heart failure, while two others were drug addicts and HIV positive. One patient admitted with traumatic paraplegia and infected gluteal decubitus ulcer developed FG.

The etiology of the necrotizing infection was identified in all 22 patients. Eight patients (36%) had ischiorectal or perianal abscesses: five had scrotal carbuncles, two had vulvar abscesses, and one patient had penile ulcers (36%). Four patients admitted with infected decubitus ulcers and another with a subcutaneous abscess on the buttock (23%) developed FG. A 65-year-old male diabetic and HIV-positive patient admitted with appendiceal abscess developed extensive skin and subcutaneous necrosis of the scrotum, anterior abdominal wall, and right flank, and subsequently died due to septic shock. Bacterial culture was positive in all patients. It revealed a single organism in seven patients (32%) and multiple organisms in 15 patients (68%). The result of the cultures is shown in Table 1. *Escherichia coli* (n = 9) was the most commonly isolated bacterium in the culture.

Table 1. Causative microorganisms in tissue cultures

Bacteria	No. of patients
Gram positive	
Streptococcus species	4
Staphylococcus aureus	4
Enterococcus species	3
Gram negative	
Escherichia coli	9
Klebsiella species	5
Pseudomonas aeruginosa	4
Acinetobacter species	6
Enterobacter species	2

15 patients (68%) had multiple organisms

The overall mortality in this study was 27%. The mean age of survivors was 52.6 years (range: 38–78 years) compared with 61.8 years (range: 49–74 years) ($P < 0.05$) for non-survivors.

The median duration of symptoms before the first debridement was eight days in patients who survived and 11 days in patients that died. The average number of repeated debridement was 2.1 for survivors and 3 for non-survivors. As expected, patients who died had a shorter hospital stay (average: 13.6 days). Hospital stay among survivors averaged 29 days. Diverting colostomy was performed in four patients (18%) with perianal infection. Five patients required plastic surgery reconstruction. The

defect in the perineal and scrotal region was closed by the mobilization of local flaps.

DISCUSSION

FG is a necrotizing fasciitis of the perineal, genital, or perianal region that may extend through fascial planes to the anterior abdominal wall, buttocks, or lower extremities. It is a rare disease, representing less than 0.02% of hospital admissions in the US with an overall incidence of 1.6 per 100,000 males[3].

Despite advances in medical therapy and intensive care procedures, FG remains a serious pathological entity with a high mortality rate[1]. FG was initially described in 1883 by Jean Alfred, a French venerealogist[4]. He reported five patients presenting with scrotal gangrene, rapid progression of the necrotizing process, abrupt onset in healthy young males, and absence of a precipitating cause. Although the first observation remains true today, an etiology can be identified in most cases and is no longer prevalent in young males, as there is an increasing age and sex mix of patients suffering from the disease[5]. While this may be a reflection of increasing longevity, most predisposing factors, such as diabetes mellitus as well as urological and colorectal diseases, present later in life[6, 7].

FG is less common in women. In a literature review of 1,726 cases, 10% were women[2]. The disparity in the number of male and female cases reported may be due to the condition being under-recognized in females[8]. It is also possible that in adhering to Fournier's original description, limiting the disease to males only, some clinicians do not recognize female genital necrotizing infections as Fournier's gangrene[2].

In our study population, the mean age was 54.7 years (range: 38–78 years) and the female-to-male ratio was 2:11. Although some previous studies reported presentation of FG at a younger age, in this review, the median age of patients is similar to that reported in literature[9].

Genital gangrene in females typically arises from a vulval or Bartholin's abscess and spreads to the perineum or anterior abdominal wall[10]. Episiotomy, septic abortion, pudendal nerve block, and coital injury are recognized predisposing factors[11].

Some systemic illnesses associated with FG include DM, alcoholism, cardiac disorders, morbid obesity, HIV infection, chronic renal failure, and malignancy. In addition, chronic use of steroids and cytotoxic drugs may be associated with FG[12]. The most common associated illness is DM. The presence of DM has been reported at 39–64% in published literature[13]. The higher incidence of DM in our series (82%) may indirectly reflect the high prevalence of the disease in the Saudi population.

Contrary to Fournier's original description about the absence of a known cause, most current analysis identifies definite etiologies. Anorectal and genitourinary infections and cutaneous injuries are the most frequent sources of infection in necrotizing fasciitis of the scrotum and perineum. The most common foci include the gastrointestinal tract (30–50%), followed by the genitourinary tract (20–40%) and cutaneous injuries (20%)[14].

Among gastrointestinal causes, ischiorectal and perianal abscesses account for 70% of FG cases[14]. Necrotizing gangrene, along with appendicitis, colorectal malignancy, and diverticulitis, has also been associated with minor anorectal procedure such as rectal biopsy, anal dilatation, and hemorrhoidectomy[14].

Genitourinary lesions associated with FG include those caused by urethral stricture, urethral trauma and instrumentation, indwelling urethral catheters, urethral stones, epididymitis, prostate biopsy, and renal abscesses[15].

Cutaneous infections include decubitus ulcers, abscess of the vulva or Bartholin's gland in women, and human and insect bites[7, 16].

The present series identified the etiology in all 22 cases. Genitourinary infections and perianal sepsis were the most common underlying local cause, constituting 36% each. Skin and subcutaneous tissue infection was found in 23% of patients. We reported one

diabetic, HIV-positive patient with perforated appendicitis who died due to septic shock owing to severe necrotizing fasciitis of the scrotum, right flank, and anterior abdominal wall. This was due to the patient's severe immunocompromised state.

Generally, necrotizing fasciitis is characterized by infectious thrombosis of the vasculature passing between the skin and deep circulation, and it usually involves a mixed microbial flora[17]. Organisms most commonly isolated from wound cultures include *Coliforms*, *Bacterioides*, hemolytic streptococci, and staphylococci. A mean of 3 organisms isolated per patient was reported[2, 18].

In our study, 68% of the cases were polymicrobial, and the most commonly isolated bacteria were *Escherichia coli* (n = 9), followed by *Klebsiella* species (n = 5), *Acinetobacter* species (n = 6), streptococci (n = 6), and *Pseudomonas aeruginosa* (n = 4). Anaerobic organisms were not isolated mostly due to the difficulty in recovering anaerobes in the culture. This study's microbiology results are similar to those reported in literature, with *Escherichia* being the most prevalent organism. In a retrospective study of microbiological trends in 4,365 patients with FG, polymicrobial organisms were found in 54% of cultures, and *Escherichia coli* was found in 46.6% of culture isolates[19].

FG management primarily includes aggressive hemodynamic stabilization, parenteral broad-spectrum antibiotics therapy, and urgent surgical debridement. Aggressive, radical debridement of all areas with overt necrosis is essential as the outcome is found to be correlated with the adequacy of the initial debridement[11].

The empiric antibiotics chosen must have a high degree of effectiveness against staphylococcal and streptococcal bacteria as well as gram-negative *Coliform*, *Pseudomonas*, and *Bacteriodes* species[15]. This can be achieved by using a carbapenem or beta-lactamase inhibitor, coupled with clindamycin for its antitoxin effects against toxin-elaborating strains of streptococci and staphylococci. Vancomycin or linezolid can be used for coverage against methicillin-resistant *Staphylococcus aureus* (MRSA)[20]. Amphotericin B or caspofungin should be added to the antibiotics regimen should fungi be detected in tissue cultures[9].

Although hyperbaric oxygen therapy (HBOT) remains a controversial issue in the treatment of FG, multiple studies have proven its benefits and justified the use of adjunctive HBOT to treat FG[21]. These studies also demonstrated a significantly reduced mortality rate in FG patients managed with adjunctive HBOT[22]. The physiological effects are believed to be enhanced ability of leukocytes to kill aerobic bacteria, stimulation of collagen formation, and increased superoxide dismutase levels resulting in better tissue survival[23]. In this study, none of the patients required HBOT.

The use of a high dose of intravenous immune globulin (up to 2g/kg) appears to be beneficial in severe necrotizing soft tissue infection, although efficacy data are not definitive[24].

The mortality rate in FG varies from 4% to 80%[25]. Most studies report a mortality of 20–40%[3]. Factors associated with high mortality rates include advanced age, median extent of body surface area involved, the presence of septic shock, DM, delay in adequate surgical intervention, and chronic renal failure[2, 26, 27].

Laor *et al.* designed an FG Severity Index (FGSI) to identify prognostic factors. The index comprises metabolic parameters (sodium, potassium, creatinine, hematocrit, WBC, and bicarbonate levels), signs of sepsis, and the extent of body surface area involved. Some authors found the FGSI useful in predicting the prognosis in FG patients[28]. A score >9 has a 75% likelihood of death, while patients with a score <9 have a 78% probability of survival[29, 30].

The overall mortality rate was 27% in this series. Advanced age was the only significant prognostic factor identified to adversely affect the patient's survival. Advanced age as a poor prognostic factor is consistent with the results in previous studies. A study in Spain showed that the survivors of FG are 13.5 years younger

than those who died[31]. In 2012, a report from Turkey showed those that succumb to FG are on average older than survivors (62 years versus 55 years)[32].

Although diverting colostomy can be beneficial to wound care, it should only be used in patients with FG involving the anorectal region with a high risk of fecal contamination. The estimated percentage of patients requiring colostomy after the debridement of FG is 15% and an increased mortality has been noted in patients requiring diversion[33]. In our study, colostomy was performed in four patients (18%) with extensive anorectal infection. Three out of four survived, and their wounds healed, which was followed by the closure of the colostomy.

Most skin defects in the scrotum, perineum, and abdominal wall after debridement often heal by secondary intention. Local skin rotational or free myocutaneous flaps and skin grafts are indicated only in patients with large tissue defects[34]. In our series, secondary wound healing occurred in the majority of surviving patients (69%). Reconstruction by using local skin flaps or skin grafts was required in only five patients (31%).

CONCLUSION

Fournier's gangrene is an infection-producing necrotizing fasciitis of the external genitalia and perineum. It has a high mortality rate despite the improvement in surgical treatment and the use of wide-spectrum antibiotics for the causative agents. Elderly patients have a poor prognosis despite aggressive therapy. An etiological factor can be identified in most cases, and the disease is no longer restricted to men. The majority of the infections are polymicrobial, and diabetes mellitus is the leading major illness associated with FG. Early recognition and intervention with radical surgical debridement, coupled with occasional reconstructive surgery, seem to be the primary determinants for successful outcomes.

REFERENCES

1. Tarchouli M, Bounaim A, Essarghini M, Ratbi MB, Belhamidi MS, Bensal A, et al. Analysis of prognostic factors affecting mortality in Fournier' gangrene: A study of 72 cases. Can Urol Assoc J. 2015 Nov–Dec; 9(11–12):E800–4.
2. Eke N. Fournier's gangrene: a review of 1726 cases. Br J Surg. 2000; 87:718–28.
3. Sorensen MD, Krieger JN, Rivara FP, Broghammer JA, Klein MB, Mack CD, et al. Fournier's Gangrene: population based epidemiology and outcomes. J Urol. 2009 May;181(5):2120–6.
4. Fournier JA. Jean-Alfred Fournier 1832–1914. Gangrène foudroyante de la verge (overwhelming gangrene). Dis Colon Rectum. 1988;13:984–8.
5. Olsofka JN, Carrillo EH, Spain DA, Polk HC Jr. The continuing challenge of Fournier's gangrene in the1990s. Am Surg. 1999;65(12):1156–9.
6. Ong HS, Ho YH. Genitoperineal gangrene: experience in Singapore. Aust N Z J Surg. 1996;66:291–3.
7. Diettrich NA, Mason JH. Fournier's gangrene: a general surgery problem. World J Surg. 1983;7:288–94.
8. Stephens BJ, Lathrop JC, Rice WT, Gruenberg JC. Fournier's gangrene: historic (1764-1978) versus contemporary (1979-1988) differences in etiology and clinical importance. Am Surg. 1993;59:149–54.
9. Chennamsetty A, Khourdaji I, Burks F, Killinger KA. Contemporary diagnosis and management of Fournier's gangrene. Ther Adv Urol. 2015 Aug;7(4):203–15.
10. Atakan IH, Kaplan M, Kaya E, Aktoz T, Inci O. A life-threatening infection: Fournier's gangrene. Int Urol Nephrol. 2002;34:387–92.
11. Meng MV, McAninch JW. Necrotizing gangrene of genitalia and perineum. Infect Urol. 1999;12(5):132–40.
12. Morpurgo E, Galandiuk S. Fournier's gangrene. Surg Clin North Am. 2002;82(6):1213–24.
13. Yanar H, Taviloglu K, Ertekin C, Guloglu R, Zorba U, Cabioglu N, et al. Fournier's gangrene: risk factors and strategies for management. World J Surg. 2006;30:1750–4.

14. Thwaini A, Khan A, Malik A, Cherian J, Barua J, Shergill I, et al. Fournier's gangrene and its emergency management. Postgrad Med J. 2006 Aug;82(970):516–9.
15. Laucks SS. Fournier's gangrene. Surg Clin North Am. 1994;74:1339–52.
16. Fialkov JM, Watkins K, Fallon B, Kealey GP. Fournier's gangrene with unusual urologic etiology. Urology. 1998;52(2):324–7.
17. Kuo CF, Wang WS, Lee CM, Liu CP, Tseng HK. Fournier's gangrene: ten-year experience in a medical center in northern Taiwan. J Microbiol Immunol Infect. 2007;40(6):500–6.
18. Baskin LS, Carroll PR, Cattolica EV, McAninch JW. Necrotising soft tissue infections of the perineum and genitalia. Br J Urol. 1990;65:524–9.
19. Tang LM, Su YJ, Lai YC. The evaluation of microbiology and prognosis of Fournier's gangrene in past five years. Springerplus. 2015 Jan 13; 4:14.
20. Stevens DL, Baddour LM. Necrotizing soft tissue infections [Internet]. Alphen aan den Rijn: Up To Date; 2016 [cited 2017 Feb]. Available from: https://www.uptodate.com/contents/necrotizing-soft-tissue-infections
21. Bhutani S, Vishwanath G. Hyperbaric oxygen and wound healing. Indian J Plast Surg. 2012 May-Aug;45(2):316–24.
22. Sharkey S. Current indications for hyperbaric oxygen therapy. Journal of the Australian Defence Health Service (ADF Health) 2000;1:64–72.
23. Ayan F, Sunamak O, Paksoy SM, Polat SS, As A, Sakoglu N, et al. Fournier's gangrene: a retrospective clinical study on forty-one patients. ANZ J Surg. 2005;75(12):1055–8.
24. Kaul R, McGeer A, Norrby-Teglund A, Kotb M, Schwartz B, O'Rourke K, et al. Intravenous immunoglobulin therapy for streptococcal toxic shock syndrome – a comparative observational study. The Canadian Streptococcal Study Group. Clin Infect Dis. 1999;28:800–7.
25. Taken K, Oncu MR, Ergun M, Eryilmaz R, Demir CY, Demir M, et al. Fournier's gangrene: causes, presentation and survival of sixty-five patients. Pak J Med Sci.2016 May-June;32(3):746–50.
26. Papachristodoulou AJ, Zografos GN, Papastratis G, Papavassiliou V, Markopoulos CJ, Mandrekas D, et al. Fournier's gangrene: still highly lethal. Langenbecks Arch Chir. 1997;382(1):15–18.
27. Jeong HJ, Park SC, Seo IY, Rim JS. Prognostic factors in Fournier gangrene. Int J Urol 2005;12(12):1041–4.
28. Chen CS, Liu KL, Chen HW, Chou CC, Chuang CK, Chu SH. Prognostic factors and strategy of treatment in Fournier's gangrene: a 12-year retrospective study. Changgeng Yi Xue Za Zhi. 1999;22(1):31–6.
29. Ersay A, Yilmaz G, Akgun Y, Celik Y. Factors affecting mortality of Fournier's gangrene: review of 70 patients. ANZ J Surg. 2007;77(1–2):43–8.
30. Kabay S, Yucel M, Yaylak F, Algin MC, Hacioglu A, Kabay B, et al. The clinical features of Fournier's gangrene and the predictivity of the Fournier's Gangrene Severity Index on the outcomes. Int Urol Nephrol. 2008;40(4):997–1004.
31. Luján MS, Budia A, Di Capua C, Broseta E, Jiménez Cruz F. Evaluation of a severity score to predict the prognosis of Fournier's gangrene. BJU Int. 2010;106(3):373–6.
32. Martinscheck A, Evers B, Lampl L, Gerngroß H, Schmidt R, Sparwasser C. Prognostic aspects, survival rate, and predisposing risk factors in patients with Fournier's gangrene and necrotizing soft tissue infections: evaluation of clinical outcome of 55 patients. Uro Int. 2012;89(2):173–9.
33. Ozturk E, Sonmez Y, Yilmazlar T. What are the indications for a stoma in Fournier's gangrene. Colorectal Dis. 2011;13:1044–7.
34. Mallikarjuna MN, Vijayakumar A, Patil VS, Shivswamy BS. Fournier's Gangrene: current practices. ISRN Surg. 2012;2012:942437.