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The management of Fournier's gangrene: A review of 60 patients

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ABSTRACT

Background: Fournier's gangrene (FG) is a rapidly progressive, destructive, necrotizing fasciitis of the perianal, perineal, and genital regions. Common clinical symptoms include sudden intense pain in the scrotum, prostration, fever, and pallor. In this study, the aim was to assess FG through a wider lens.

Methods: 60 patients that presented with FG at the authors' hospital over a 6-year period between April 2008 and March 2014 were retrospectively reviewed. Age, gender, site of gangrene, risk factors, symptoms, microbiology, treatment modalities, Fournier's Gangrene Severity Index score (FGSI), and mortality data were evaluated.

Results: 60 male patients with a mean age of 55 (ranging between 48-62) were included in the study. 50 patients survived and the mortality rate was 16.6%. Septic shock (n: 4), cardiogenic shock (n:4), and pneumonia (n:2) were the official causes of death. As a risk factor, 45 (75%) patients had diabetes mellitus (DM), 40 (66.6%) had hypertension (HT), and 35 (58.3%) had both DM and HT. There were no other co-morbidities in the 10 (16.6%) remaining patients. All the surviving 50 patients were suitable for surgical reconstruction. A split thickness skin grafting procedure was performed for 46 (76.6%) patients and flap reconstruction was performed for 4 (6.6%). None of the patients had hyperbaric oxygen therapy (HBO). The mean length of hospitalization was 16 days (ranging from 5-58) for all patients.

A mean FGSI score at admission was 5.02 ± 2.45 for survivors compared with 13.8 ± 4.53 for non-survivors. A mean FGSI score was 4.56 ± 2.28 for survivors and 11.50 ± 2.63 for non-survivors during hospitalization.

Conclusion: Although FG has a high mortality rate, appropriate management of the disease can reduce it. Early diagnosis, surgical debridement, vacuum-assisted closure application, and antibiotherapy are essentials for treating FG.

Key words: *Fournier's Gangrene, VAC, therapy, review*

Introduction

Fournier's gangrene (FG) is a rapidly progressive, destructive, necrotizing fasciitis of perianal, perineal, and genital regions, classified as a type 1 necrotizing fasciitis of polymicrobial etiology [1]. Gram-positive and Gram-negative, as well as strictly anaerobic, bacterias are the most commonly isolated agents from FG lesions [2]. A few distinct necrotizing fasciitis syndromes should be recognized. The 3 most important are as follows: Type I, or polymicrobial; Type II, or group A streptococcal; and Type III gas gangrene [1, 2]. FG has great mortality risk if inappropriately treated. FG was first described by Baurienne in the 18th century, however it was named for French venerologist, Jean-Alfred Fournier [3, 4]. Although FG is a devastating and fatal disease, its overall incidence is just 1.6/100000

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males [5]. Typically, males are affected, though FG is diagnosed in women, albeit rarely [6]. The mean age of presenting FG is 53–55 years [7, 8]. A number of health conditions are defined as risk factors, including diabetes mellitus (DM), hypertension (HT), alcoholism, advanced age, malnutrition or obesity, chronic renal failure, chronic liver disease, malignancies and other conditions causing immunosuppression, long-term bladder catheterization, urethral stricture, local trauma and perianal disease [9]. Despite advances in treatment, the mortality rate ranges from 4% to 80% (mean: 20-40%) [10-13]. Typical clinical symptoms include sudden intense pain in the scrotum, prostration, fever, and pallor [9, 14]. Apart from symptoms, biochemical markers may be useful for risk stratification and prediction of mortality [1, 9]. Fournier's Gangrene Severity Index (FGSI) and the Acute Physiology and Chronic Health Evaluation (APACHE) II scoring system are basic prognostic scores for risk of mortality with FG. The FGSI is a score obtained from a combination of physiological hospital admission parameters, including heart rate, temperature, respiratory rate, sodium, potassium, bicarbonate, creatinine, hematocrit, and leukocytes to stratify risk [15- 16]. Surgical debridement, antibiotic treatment, hyperbaric oxygen, vacuum-assisted closure (VAC), reconstructive surgery of the genitalia, and extensive skin grafting are the main goals with FG treatment [9, 17].

The aim of this retrospective study was to define and discuss management of FG based on the authors' surgical experiences.

Materials and Methods

60 patients presented with FG at the authors' hospital over a 6-year period between April 2008 and March 2014 and were retrospectively reviewed. Age, gender, site of gangrene, risk factors, symptoms, microbiology, treatment modalities, FGSI score, and mortality data were evaluated.

Metronidazole and third-generation cephalosporine antibiotherapy was initiated during admission and stay in the hospital for all patients intravenously. The antibiotherapy was revised according to microbiological analysis of the excised tissue samples in the first debridement. Tetanus prophylaxis was given to all patients. Radical debridements were performed while

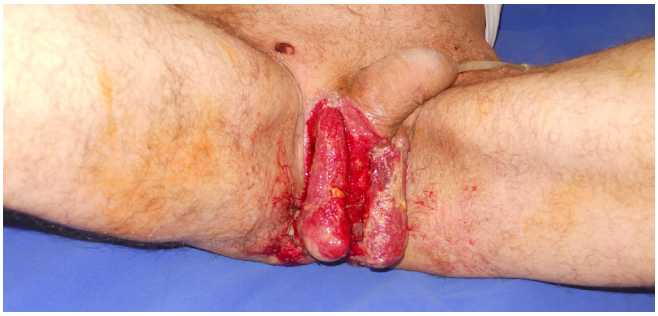

Figure 1. View of patient after radical debridements.

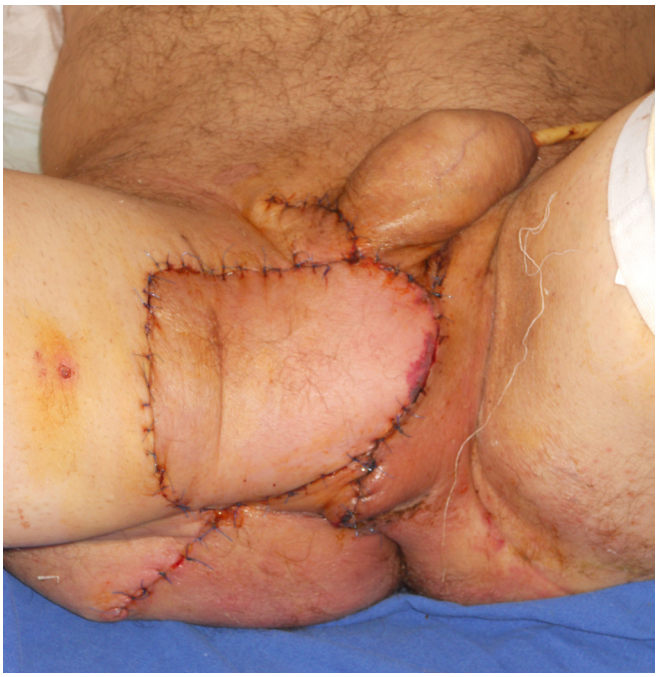

Figure 2. View of patient after medial circumflex femoral artery perforator flap surgery.

patients underwent spinoepidural anesthesia (Figure 1). Vacuum-assisted closure (VAC; Kinetic Concepts, Inc., San Antonio, TX) was applied to all patients. VAC dressings were changed every 72 hours while patients were under anesthesia for wound exploration in the operating room. Additional debridements were performed during wound explorations as necessary. Debridements were terminated after the removal of all necrotic tissues and the formation of healthy granulation tissue. Patients with critical situations, such as severe sepsis, requiring vasopressors, or mechanical ventilation support, were followed in the intensive care unit (ICU). Wounds were reconstructed by employing split-thickness skin grafts (STSG) in 46 patients and medial circumflex femoral artery perforator flap in 4 patients (Figures 2, 3).

Clinical parameter differences were compared between survivors and non-survivors and Statistical

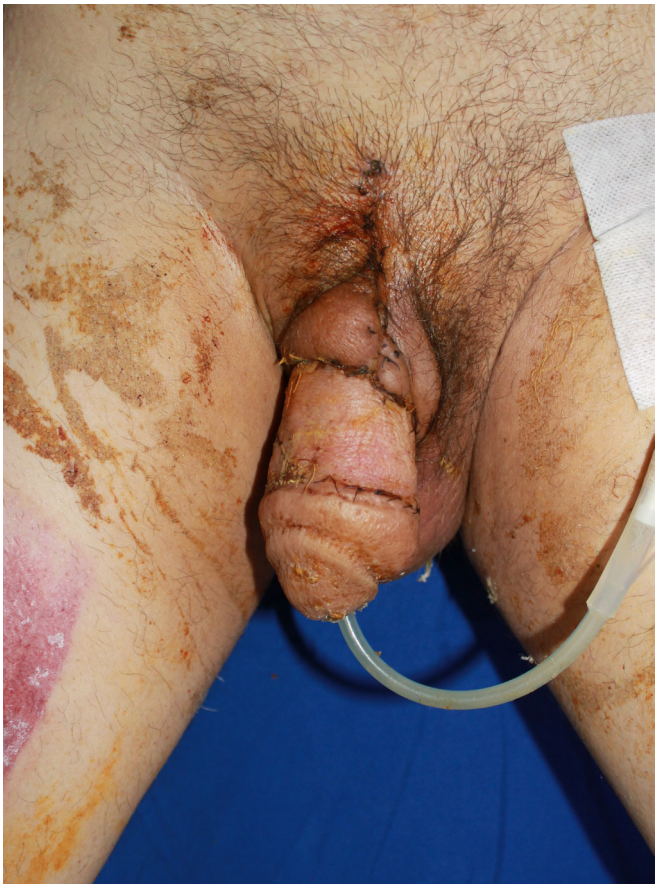

Figure 3. The use of a split-thickness skin graft for penile shaft reconstruction.

Package for Social Sciences (SPSS) for Windows 17.0 software was utilized for data analysis. Central tendency measures, means, and percentages were used.

Results

50 patients survived - the mortality rate was 16.6%. Septic shock (n: 4), cardiogenic shock (n:4) and pneumonia (n:2) were the noted causes of death.

All patients were admitted primarily to the authors' emergency department. Sudden intense pain in the scrotum, prostration, fever, and pallor were common clinical symptoms, and the median duration of symptoms (from onset to arrival at the hospital) was 3 days (ranging from 1-5). All perianal, perineal, and genital regions were affected in all patients.

As a risk factor, 45 (75%) patients had DM, 40 (66.6%) had HT, and 35 (58.3%) had both DM and HT. There were no other co-morbidities for 10 (16.6%) patients.

The etiology of FG was urogenital disease in 34 (56.6%) patients and anorectal diseases in 26 (43.3%) patients.

The most common isolated bacteria from patients was Escherichia Coli in 52 (86.6%) patients, Staphylococci in 5 (8.3%) and Streptococci in 3 (5%).

All patients underwent at least one radical debridement within 12 hours of admission to the hospital and the mean debridement number was 3 (ranging from 1-5). Spinoepidural anesthesia was performed in 46 (76.6%) patients that underwent the STSG procedure; however, 4 (6.6%) patients required general anesthesia for flap reconstruction.

6 (10%) patients were followed in the ICU for a median of 6 days (ranging from 2-10 days), and all patients needed mechanical ventilation support. The mortality rate for patients requiring mechanical ventilation support was 66.6%.

All the surviving 50 patients were suitable for surgical reconstruction. The STSG procedure was performed for 46 (76.6%) patients and flap reconstruction was conducted in 4 (6.6%) patients. None of the patients had HBO. Length of hospitalization was 16 days (5-58) for all patients.

The mean FGSI score at admission was 5.02 ± 2.45 for survivors compared with 13.8 ± 4.53 for non-survivors. A mean FGSI score was of 4.56 ± 2.28 for survivors and 11.50 ± 2.63 for non-survivors during hospitalization.

Discussion

Although FG is a life-threatening condition, the disease is relatively rare. Sorensen et al. Reported an incidence of just 1.6/100000 males [5]. Though male patients are affected typically, FG is occasionally seen in women. Sporadic FG cases have been described in the literature previously [9, 10]. Moreover, a 10:1 male-to-female ratio has been reported [18]. Here, all patients were male with a mean age of 55.

With this, the mortality rate was 16.6% in this retrospective study, below what has been detailed in the literature, where rates of 20–40% is the norm with a range of 4% to 80% [10- 13]. A more specific population-based fatality rate put forth by Sorensen et. Al. was 7.5% in a group of 1680 patients, lower than any other tertiary care center results [5]. The most common mortality causes are sepsis and acute respiratory distress syndrome, septic shock, disseminated intravascular coagulopathy, acute kidney and hepatic failure, and multiple organ failure [8].Septic shock, cardiogenic shock,

and pneumonia were the causes of death in this study.

FG patients also have various co-morbidities, such as DM, HT, alcoholism, advanced age, malnutrition or obesity, chronic renal failure, chronic liver disease, malignancies and other conditions causing immunosuppression, long-term bladder catheterisation, urethral stricture, local trauma, and perianal disease [9]. As risk factors in the present work, 75% patients had DM, 66.6% had HT, and 58.3% had both DM and HT. There were no other co-morbid scenarios for 16.6% patients of this study.

The duration of hospital stay ranged from several to over 50 days [6, 8, 11]. Ersay et al. reported a median hospitalization time of 26.0 days for survivors compared to 8.0 days for non-survivors [11]. Ferreira et al. observed a mean hospital stay of 73 days [14]. The average length of stay in at the hospital was 16 days (5-58) for all patients in this study.

The FGSI score was first described by Laor et al. and comprises nine parameters, including body temperature, heart and respiratory rate, serum levels of sodium, potassium, creatinine and bicarbonate, as well as hematocrit value and leukocyte count. It was concluded that a score > 9 was associated with a 75% probability of death, while a score of < 9 corresponded to a 78% probability of survival [16]. Yeniyol et al., Ulug et al., and Ersay et al. successfully confirmed the usefulness of this score [11-13]. However, Tuncel et al. saw no correlation between the FGSI and disease severity or patient survival [19]. From the data of this work, the mean FGSI score at admission was 5.02 ± 2.45 for survivors compared with 13.8 ± 4.53 for non-survivors and the mean FGSI score was 4.56 ± 2.28 for survivors and 11.50 ± 2.63 for non-survivors during hospitalization.

Redness of the skin, swelling of the tissues, fever, pain, crepitus of the inflamed tissue, prostration, and pallor are the common clinical findings for FG [9, 14]. Ferreira et al. reported that the most affected regions were the scrotum (93.3%), the penis (46.5%), and the perineum or perianal region (37.2%) [14]. In this study, sudden intense pain in the scrotum, prostration, fever, and pallor were what were commonly observed, and the median duration of symptoms (from onset to arrival at the hospital) was 3 days (ranging from 1-5). All the perianal, perineal, and genital regions were affected in all patients.

Gram-positive and Gram-negative, as well as strictly anaerobic, bacteria are the most commonly isolated agents from FG lesions, though fungal etiology might occur rarely [2]. The majority of the isolated bacteria from FG patients are the normal flora of the urogenital or anorectal regions, like enteric rods (Escherichia coli, Klebsiella spp., Proteus spp.), Gram-positive cocci (Staphylococci, Streptococci, Enterococci), and obligate anaerobic bacteria (Clostridium spp., Bacteroides spp., Fusobacterium spp., Peptococcus spp., Peptostreptococcus spp.) [8, 11]. In the current study, the most common isolated bacteria from patients was Escherichia Coli in 86.6% patients, Staphylococci in 8.3%, and Streptococci in 5%.

A broad-spectrum penicillin or third-generation cephalosporin and an aminoglycoside, plus metronidazole or clindamycin, was administered for empirical antibiotherapy while awaiting the results of the microbiological cultures [9]. Pais et al. suggested a combination of ciprofloxacin and clindamycin [20]. Mallikarjuna et al. advocated that triple antibiotic therapy combined with radical debridement is essential for the treatment of FG [9]. It is known that clindamycin is efficacious against toxin production and cytokine modulation. Therefore, a combination of metronidazole and third-generation cephalosporine antibiotherapy was given to patients during admission. As tetanus prophylaxis is advocated in cases with soft-tissue injury [20], it was provided to all patients.

However, Ersay et al. had found that the FGSI score corresponds to the number of debridements among survivors [11]. With this, it is reported that multiple surgical debridements are often required, with an average of 3.5 procedures required per patient [21]. Surgical debridement must be performed in the early period of the disease and aggressively, with extensive excision of the necrotic tissue. All patients in this study underwent at least one radical debridement within 12 hours of admission and the mean debridement number was 3 (ranging between 1-5). The VAC system has multiple advantages, such as speedier healing and minimizing skin defects [9]. VAC therapy was performed for all patients, and VAC dressings were changed in every 72

hours while patients were under general or spinal anesthesia for wound exploration in the operating room. HBO, topical applications, such as honey or lyophilized collagenase, are recommended by some as an additional therapy [9, 10]. However, it was decided not to use additional therapies.

Extensive STSG and flaps are the main reconstruction options [17]. Coskunfirat et al. performed medial circumflex femoral artery perforator flap in 7 patients, and reported ease of flap transfer, ability to thin the flap to improve scrotal contour, and low donor-site morbidity [22]. El-Khatib documented perfect flap survival and sensation with a V-Y island fasciocutaneous pudendal thigh flap reconstruction in 8 patients [23]. Chen et al. used gracilis flap for 3 patients with defects in the perineal area [24]. The pedicled anterolateral thigh and vertical rectus abdominis myocutaneous flaps are other described choices for FG-related defects [22-24]. The STSG procedure was performed for 46 patients and a medial circumflex femoral artery perforator flap was performed for 4 patients in this study.

Conclusion

Although FG has a high mortality rate, appropriate management of the disease can reduce it. Early diagnosis, surgical debridement, VAC application, and antibiotherapy are essentials for FG treatment. Although it appears that split-thickness skin grafting is the best choice when addressing FG, the use of perforator flaps should also be kept in mind.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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References

1. Chennamsetty A, Khourdaji I, Burks F, Killinger KA. Contemporary diagnosis and management of Fournier's gangrene. Ther Adv Urol 2015;7:203-15.
2. Johnin K, Nakatoh M, Kadowaki T, Kushima M, Koizumi S, Okada Y. Fournier's gangrene caused by Candida species as the primary organism. Urology 2000;56:153.
3. Baurienne H. [Sur une plaie contuse qui s'est ter¬minee par le sphacele de la scrotum][Article in French]. J Med Chir Pharm 1764;20:251–6.
4. Fournier JA. Jean-Alfred Fournier 1832-1914. Gangrène foudroyante de la verge (overwhelming gangrene). Sem Med 1883. Dis Colon Rectum 1988;31:984-8.
5. 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;181:2120-6.
6. Sinha R, Arachchi A, Lee P, Marwan K. Fournier gangrene in pregnancy. Obstet Gynecol 2015;125: 1342-4.
7. Kara E, Müezzinoğlu T, Temeltas G, Dinçer L, Kaya Y, Sakarya A, et al. Evaluation of risk factors and severity of a life threatening surgical emergency: Fournier's gangrene (a report of 15 cases). Acta Chir Belg 2009;109:191-7.
8. 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;40:500-6.
9. Mallikarjuna MN, Vijayakumar A, Patil VS, Shivswamy BS. Fournier's Gangrene: Current Practices ISRN Surg 2012;2012:942437.
10. Benjelloun el B, Souiki T, Yakla N, Ousadden A, Mazaz K, Louchi A, et al. Fournier's gangrene: our experience with 50 patients and analysis of factors affecting mortality. World J Emerg Surg 2013;8:13.
11. Ersay A, Yilmaz G, Akgun Y, Celik Y. Factors affecting mortality of Fournier's gangrene: review of 70 patients. ANZ J Surg 2007;77:43-8.
12. Uluğ M, Gedik E, Girgin S, Celen MK, Ayaz C. The evaluation of microbiology and Fournier's gangrene severity index in 27 patients. Int J Infect Dis 2009;13:e424-30.
13. Yeniyol CO, Suelozgen T, Arslan M, Ayder AR. Fournier's gangrene: experience with 25 patients and use of Fournier's gangrene severity index score. Urology 2004;64:218-22.
14. Ferreira PC, Reis JC, Amarante JM, Silva AC, Pinho CJ, Oliveira IC, et al. Fournier's gangrene: a review of 43 reconstructive cases. Plast Reconstr Surg 2007;119:175-84.
15. Yilmazlar T, Ozturk E, Alsoy A, Ozguc H. Necrotizing soft tissue infections: APACHE II score, dissemination, and survival. World J Surg 2007;31:1858-62.

16. Laor E, Palmer LS, Tolia BM, Reid RE, Winter HI. Outcome prediction in patients with Fournier's gangrene. J Urol 1995;154:89-92.
17. Champion SE. A case of Fournier's gangrene. Urol Nurs 2007;27:296-9.
18. Kim SY, Dupree JM, Le BV, Kim DY, Zhao LC, Kundu SD. A contemporary analysis of Fournier gangrene using the National Surgical Quality Improvement Program. Urology 2015;85:1052-6.
19. Tuncel A, Aydin O, Tekdogan U, Nalcacioglu V, Capar Y, Atan A. Fournier's gangrene: Three years of experience with 20 patients and validity of the Fournier's Gangrene Severity Index Score. Eur Urol 2006;50:838-43.
20. Burch DM, Barreiro TJ, Vanek VW. Fournier's gangrene: be alert for this medical emergency. JAAPA 2007;20:44-7.
21. Chawla SN, Gallop C, Mydlo JH. Fournier's gangrene: an analysis of repeated surgical debridement. Eur Urol 2003;43:572-5.
22. Coskunfirat OK, Uslu A, Cinpolat A, Bektas G. Superiority of medial circumflex femoral artery perforator flap in scrotal reconstruction. Ann Plast Surg 2011;67:526-30.
23. El-Khatib HA. V-Y fasciocutaneous pudendal thigh flap for repair of perineum and genital region after necrotizing fasciitis: modification and new indication. Ann Plast Surg 2002;48:370-5.
24. Chen SY, Fu JP, Chen TM, Chen SG. Reconstruction of scrotal and perineal defects in Fournier's gangrene. J Plast Reconstr Aesthet Surg 2011;64:528-34.