

Characteristics, microorganism, and antibiotic profile of patients with Fournier's gangrene in a tertiary care centre in Indonesia: A retrospective analysis of 43 cases

Jeremy Thompson Ginting^{*1,2}, Gampo Alam Irdam^{1,2}

¹Department of Urology, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia

²Cipto Mangunkusumo General Hospital, Jakarta, Indonesia

Original Article

ABSTRACT

ARTICLE INFO

Keywords:

antibiotics
characteristics
fournier's gangrene
microorganism

*Corresponding author:

ginting.jeremy@yahoo.co.id

DOI: 10.20885/JKKI.Vol13.Iss3.art2

History:

Received: September 24, 2021

Accepted: Oktober 3, 2022

Online: December 5, 2022

Copyright ©2022 Authors.
This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International Licence (<http://creativecommons.org/licenses/by-nc/4.0/>).

Background: Fournier's gangrene (FG) is a fatal condition that often leads to death if not treated properly. To this date, there are no data regarding FG in Indonesia.

Objective: This study aims to investigate the characteristics of patients with FG.

Methods: A cross-sectional study design was used to evaluate the medical records of patients admitted to Cipto Mangunkusumo Hospital between January 2012 and December 2017.

Results: The median age of the subjects were 51 (2-81) years. All of the subjects were male and presented with scrotal pain. The scrotal abscess was found in 38 (88.4%) cases. Type II diabetes was found in 10 (23.3%) subjects. E. coli was the most dominant causative agent in 28 (65.1%) cases. Meropenem was administered in 16 (37.2%) subjects, and 16 (37.2%) subjects had antibiotics administered for ≤7 days.

Conclusion: Although the mortality rate has decreased, those with FG tend to have a long hospital stay, which implies a high risk of complications. All males presenting with scrotal pain should be suspected of FG. Further studies on long-term hospitalisation complications in those with FG are required.

Latar Belakang: Gangren Fournier (GF) merupakan kondisi fatal yang sering menyebabkan kematian jika tidak ditangani dengan baik. Sampai saat ini, belum ada data mengenai GF di Indonesia.

Tujuan: Penelitian ini bertujuan untuk mengetahui karakteristik penderita GF.

Metode: Penelitian ini dilakukan dengan desain potong-lintang berdasarkan evaluasi data rekam medis pasien GF yang dirawat di Rumah Sakit Cipto Mangunkusumo selama periode Januari 2012 hingga Desember 2017.

Hasil: Median usia subjek adalah 51 (2-81) tahun. Semua subjek adalah laki-laki dan mengeluhkan nyeri skrotum. Abses skrotum ditemukan pada 38 (88,4%) kasus. Diabetes tipe II ditemukan pada 10 (23,3%) subyek. Escherichia coli merupakan patogen penyebab paling dominan, yaitu pada 28 (65,1%) kasus. Meropenem diberikan pada 16 (37,2%) subjek, dan 16 (37,2%) subjek diberikan antibiotik selama 7 hari

Kesimpulan: Meskipun angka kematian mengalami penurunan, penderita GF cenderung memiliki lama rawat inap yang tinggi dan berimplikasi pada risiko komplikasi yang tinggi. Semua laki-laki dengan keluhan nyeri skrotum harus dicurigai sebagai GF. Penelitian lebih lanjut mengenai komplikasi terkait lamanya durasi rawat inap pada pasien GF masih diperlukan.

INTRODUCTION

Fournier's gangrene (FG) is infective necrotising fasciitis affecting the external genitalia and perineal or perianal regions that are acute, rapidly progressive, and potentially fatal.¹ FG is a rare disease, accounting for 0.02% of all hospital admissions.² If not treated promptly, FG can progress to sepsis and multiple organ failures, leading to a high mortality rate, which varies from 20 to 50%.³⁻⁶ FG commonly affects men but can also occur in women and children.¹

Generally, the cause of FG is a polymicrobial infection associated with multiple cofactors in the background, and most infections arise from anorectal, genito-urinary, and cutaneous sources.⁷ Local trauma, urogenital pathologies, such as urethral stricture, perianal disease, and surgical operations, as well as colorectal diseases alone or associated with diabetes mellitus, obesity, malignant disease, peripheral vascular disease, immunosuppression, chronic alcoholism, malnutrition, malignancy and low socioeconomic status have also been cited as the main predisposing factors.⁸⁻¹⁰ Those with FG often present with erythema, pain and swelling. There is often crepitus, gangrene, or blister formation on the skin.⁷ To this date, there are no data regarding FG in Indonesia. The present study aims to investigate the characteristics of patients with FG in Indonesia.

METHODS

A retrospective study design was used to

evaluate patients' medical records admitted to the emergency department and hospital ward of Cipto Mangunkusumo Hospital, Jakarta, Indonesia, from January 2012 to December 2017. The diagnosis of FG was based on the patient's medical history and physical examination. Data including demography, clinical presentation, accompanying disease, and mortality were evaluated. Mortality was defined as disease-related death during the hospital stay. Those with incomplete medical records were excluded.

Statistical analysis was performed using SPSS 21 for Mac. Numerical variables were assessed for their normality distribution using the Kolmogorov-Smirnov test. Mean and standard deviations (SDs) were calculated for continuous variables, and median values were given for discrete variables. Numerical variables were compared using the independent T-test or Mann-Whitney U test, while categorical variables were compared using Pearson's Chi-square or Fisher's exact test. Multivariate logistic regression was used to analyse all variables whose p-value was less than 0.25. A p-value of less than 0.05 was considered statistically significant. Information obtained from the medical records was presented through tables.

RESULTS

Characteristics

In this study, all subjects were male. The median age was 51 (2-87) years of age, and the median length of stay (LOS) was 9 (8-35) days.

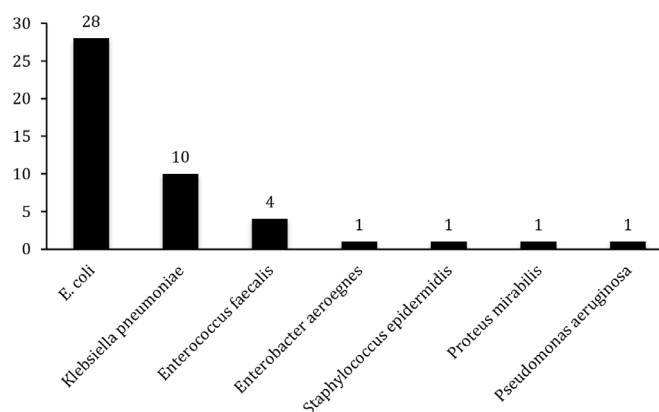


Figure 1. Microorganism profile

For etiologic factors, the scrotal abscess was the most common predisposition factor, as it was 38 (88.4%) in total. Diabetes was 10 (23.3%) as the most common accompanying disease. In symptoms, scrotal pain and swelling were nearly identical, with 43 (100%) and 42 (97.7%) in total, respectively. The median amount of debridement was 2 (1-4). Reoperation was done

in 5 (11.6%) patients.

In our study, *E. coli* was the most dominant causative agent. It was presented in 28 (65.1%) cases (Figure 1). The second most frequent organism was *Klebsiella pneumoniae*, which was presented in 10 (23.2%) subjects. In this study, 16 (37.2%) of the subjects had antibiotics administered for ≤ 7 days (Table 3).

Table 1. Characteristics of the subjects

	Numbers	Proportion
Gender		
Male	43	100%
Female	0	0%
Age (years)	51 (2-86) ^a	
Length of stay (days)	9 (8-35) ^a	
In-hospital mortality	0	0%
Etiologic factor		
Scrotal abscess	38	88.4%
Perianal abscess	7	16.3%
Penoscrotal abscess	3	7%
Perianal abscess	1	2.3%
Accompanying diseases		
Diabetes	10	23.3%
Malignancy	4	9.3%
End-stage liver disease	2	4.7%
Chronic alcoholism	0	0%
Paraplegia	2	4.7%
Postoperative wound infection	2	4.7%
Trauma	2	4.7%
Symptoms		
Scrotal pain	43	100%
Swelling	42	97.7%
Perianal pain	9	20.9%
Penoscrotal pain	2	4.7%
Mental obtundation	9	20.9%
Debridement	2 (1-4) ^a	
Reoperation	5	11.6%

Table 2. Antibiotics were administered to the subjects

Antibiotic	Numbers	Proportion
Meropenem	16	37.2%
Metronidazole	14	32.5%
Cefoperazone sulbactam	13	30.2%
Ceftriaxone	8	18.6%
Amikacin	7	16.3%
Cefixime	7	16.3%
Levofloxacin	6	14%
Ampicillin-sulbactam	6	14%
Cefepime	3	7%
Cefotaxime	2	4.7%
Clindamycin	2	4.7%
Ampicillin	2	4.7%
Ceftazolin	1	2.3%
Chloramphenicol	1	2.3%
Cotrimoxazole	1	2.3%
Gentamycin	1	2.3%
Imipenem	1	2.3%
Tigecycline	1	2.3%
Vancomycin	1	2.3%

Table 3. Duration of antibiotic

Duration of antibiotic	Numbers	Proportion
≤7 days	16	37.2%
8-10 days	13	30.2%
11-14 days	6	14%
≥15 days	8	18.6%

DISCUSSION

FG, first described by Fournier in 1883, is necrotising fasciitis affecting the perianal region. In males, the initial presentation of FG usually involves the scrotum and penis in men, while in females, infection usually starts on the vulva and groin. In our study, all subjects had scrotal pain. The differential diagnosis of FG includes numerous conditions, including acute epididymitis, orchitis, strangulated hernia, cellulitis streptococcal necrotising fasciitis, vascular occlusion syndromes, herpes simplex virus infection, gonococcal balanitis, pyoderma

gangrenosum, allergic vasculitis, polyarteritis nodosa, necrolytic migratory erythema, warfarin necrosis, and ecthyma gangrenosum.¹¹⁻¹³

The source of the infecting organisms in FG is most commonly the periurethral glands. Other portals of microbial entry have been reported to be scrotal abscesses, urethral strictures, perirectal abscesses, ruptured appendices, colonic carcinoma, diverticulitis, and dermatological conditions.¹⁴ Other less common portals include hernia repair, hemorrhoidal banding, urethral catheterisation, neonatal circumcision, prostatic biopsy, vasectomy

operations, tension-free vaginal tape procedure, sacral pressure ulcer, local trauma from coitus, and excessive masturbation.^{5,15-20} FG can also be associated with injuries, burns, abrasions, lacerations, bruises, animal bites, insect bites, and subcutaneous and intravenous injections.⁴ In our study, 38 (88.4%) out of 43 patients had scrotal abscess as the etiologic factor.

When firstly described, the typical patient of FG was a young, healthy male who developed an idiopathic, fulminant, necrotising fasciitis of the male genitalia. However, his classic picture of the FG patient has evolved. FG is associated with several different comorbidities, has distinct etiologies, afflicts both young and old, and affects female patients.²¹ In the present study, all the subjects were male, with a median age of 51, ranging from two to 68 years old. Although FG may affect both sexes, it is more common among men and the elderly.^{22,25} Recent data suggest that FG most commonly affects males aged between 50 and 60.²¹ The reason for its decreased prevalence in women is explained by the simpler drainage of the female perineum via the vaginal route. Furthermore, many reports on this condition have been published by urology clinics where men predominated in samples, leading to males being over-represented in reports. In a study of 1726 FG patients, Eke et al. found that FG was ten times more frequent in males.⁵ The reason for the higher incidence of FG among the elderly may be increased susceptibility to the diseases due to a weak immune response secondary to chronic disorders and an increased prevalence of circulatory disturbances due to more common vascular pathologies at an advanced age.²⁵ This explanation also applies to type II diabetes as a predisposing factor for FG since diabetes usually leads to a weakened immune system. The study has found that diabetes mellitus is the most frequent accompanying disease, accounting for 10 (23.3%) subjects. In the existing literature, type II diabetes is reported to be present in 20 to 70% of those with FG.²⁶

Although FG is a life-threatening emergency associated with high morbidity and mortality, it has been reported that current mortality rates of

FG range from 4.7% to 10.1%, which is relatively not a high number.^{13,21,27,28} This may be due to the advance in diagnosis and treatment. In our study, no patients died during their hospital stay. While those with FG may not have low mortality rates, previous studies have shown that they still encounter long and complicated hospital stays. Existing literature has shown significant variability in LOS, ranging from 2 to 278 days.¹³ However, regardless of the expected high complication risks during long hospitalisation, we did not assess the inpatient complication rate during a hospital stay, and data regarding this rate is also scarce. Our study's median length of stay (LOS) was 9 days, ranging from 8 to 35 days.

The mainstay of treatment of FG is early detection and urgent surgical debridement. In the present study, the median number of debridement was 2. This is lower compared to previous findings, averaging 3.5 procedures per patient.¹ Five (11.6%) subjects required reoperations. The number of debridement and reoperation rate are prognostic factors; it is known that those undergoing reoperations presented a higher mortality risk. Reoperations are usually necessary when infections progress and develop necrotising fasciitis, although initial debridement has been performed. This suggests that those who require reoperations had extremely aggressive FG features.²⁹

In our study, *E. coli* was the most dominant causative agent. It has been reported to be the most frequent organism isolated from the wound; however, this could be due to the commensal nature of these organisms in the perianal region. Anaerobes are less commonly encountered, which may be due to technical faults.³⁰ Meropenem was the most antibiotic therapy administered to the patients, and most subjects had antibiotics administered for ≤ 7 days. Antibiotic therapy at our institution is generally initiated with broad-spectrum antibiotics covering gram-positive, Gram-negative, and anaerobic organisms, with changes made according to patient allergies or if cultures from the referral institution are available. When cultures are available, antibiotics are narrowed

to cover only organisms isolated in operative cultures. Contingent to provider preference, patients usually stop their antibiotics after surgical source control has been obtained and clinically improved, without a set course of 14 days of therapy.³¹ Existing literature suggested that empiric broad-spectrum antibiotic therapy should be instituted as soon as possible until the culture results are available, and the antibiotic regimen chosen must have a high degree of effectiveness against staphylococcal and streptococcal bacteria, as well as gram-negative, coliforms, pseudomonas, bacteroides, and clostridium.¹ In this study, those with shorter antibiotic durations most likely had antibiotics stopped after source control was obtained and clinical improvement was seen. A shorter course of antibiotics may decrease a patient's risk of developing *C. difficile* infection, a potentially fatal hospital-acquired condition, without decreasing the likelihood of wound closure or spreading infection.³¹

CONCLUSION

FG is a surgical emergency that develops acutely and progresses rapidly. Although the mortality rate has decreased more recently, FG patients tend to have a long hospital stay, which implies a high risk of complications. All males presenting with scrotal pain should be suspected of FG. Further studies are required to investigate the complications of prolonged hospitalisation in FG patients.

CONFLICT OF INTEREST

The authors declare that they have no potential conflict of interest or personal relationships that could have appeared to influence the work reported in this paper.

ACKNOWLEDGEMENT

This research has received no external funding.

REFERENCES

1. Mallikarjuna MN, Vijayakumar A, Patil VS, Shivswamy BS. Fournier's gangrene: Current practices. *ISRN Surgery*. 2012;1-8.
2. Singh A, Ahmed K, Aydin A, Khan MS, Dasgupta P. Fournier's gangrene. A clinical review. *Archivio Italiano di Urologia e Andrologia*. 2016;88(3):157-64.
3. Ward L, Eisenson D, Fils J-L. Fournier's gangrene of the penis in a 12-year-old patient secondary to phimosis. *Rhode Island Medical Journal* (2013). 2016;99(12):45-6.
4. Dos-Santos DR, Roman ULT, Westphalen AP, Lovison K, Neto FACS. Profile of patients with Fournier's gangrene and their clinical evolution. *Revista do Colégio Brasileiro de Cirurgiões*. 2018;45(1).
5. Eke N. Fournier's gangrene: A review of 1726 cases. *British Journal of Surgery*. 2000;87(6):718-28.
6. Morua AG, Lopez JAA, Garcia JDG, Montelongo RM, Guerra LSG. Fournier's gangrene: Our experience in 5 years, bibliographic review and assessment of the Fournier's gangrene severity index. *Archivos Españoles de Urología*. 2009;62(7):532-40.
7. Ersay A, Yilmaz G, Akgun Y, Celik Y. Factors affecting mortality of Fournier's gangrene: Review of 70 patients. *ANZ Journal of Surgery*. 2007;77(1-2):43-8.
8. 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 Journal of Surgery*. 2005;75(12):1055-8.
9. Ozden Yenyol C, 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(2):218-22.
10. 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 Chirurgica Belgica*. 2009;109(2):191-7.
11. Chennamsetty A, Khourdaji I, Burks F, Killinger KA. Contemporary diagnosis and management of Fournier's gangrene. *Therapeutic Advances in Urology*. 2015;7(4):203-15.
12. Ayumba BR, Magoha GA. Management of

- Fournier's gangrene at the Kenyatta National Hospital, Nairobi. *East African Medical Journal* 1998;75(6):370-3.
13. Furr J, Watts T, Street R, Cross B, Slobodov G, Patel S. Contemporary trends in the inpatient management of Fournier's gangrene: Predictors of length of stay and mortality based on population-based sample. *Urology*. 2017;102:79-84.
 14. Koukouras D, Kallidonis P, Panagopoulos C, Al-Aown A, Athanasopoulos A, Rigopoulos C, et al. Fournier's gangrene, a urologic and surgical emergency: Presentation of a multi-institutional experience with 45 cases. *Urologia Internationalis* 2011;86(2):167-72.
 15. Chantarasak ND, Basu PK. Fournier's gangrene following vasectomy. *British Journal of Urology*. 1988;61(6):538-9.
 16. Viddeleer AC, Lycklama a Nijeholt GAB. Lethal Fournier's gangrene following vasectomy. *Journal of Urology*. 1992;147(6):1613-4.
 17. Riedler I, Primus G, Trummer H, et al. Fournier's gangrene after tension-free vaginal tape (TVT) procedure. *International Urogynecology Journal*. 2004;15(2):145-6.
 18. Fukui K, Fujioka M, Ishiyama S. Sacral pressure ulcer-induced Fournier's gangrene extending to the retroperitoneum: a case report. *Wounds*. 2018 ;30(1):E5-8.
 19. Quatan N, Kirby RS. Improving outcomes in Fournier's gangrene. *BJU International*. 2004;93(6):691-2.
 20. Heiner JD, Eng KD, Bialowas TA, Devita D. Fournier's gangrene due to masturbation in an otherwise healthy male. *Case Reports in Emergency Medicine*. 2012;2012:154025.
 21. Ferretti M, Saji AA, Phillips J. Fournier's gangrene: a review and outcome comparison from 2009 to 2016. *Advances in Wound Care*. 2017;6(9):289-95.
 22. Erdoğan A, Aydoğan I, Şenol K, Üçkan EM, Ersöz S, Tez M 3. Simple scoring system for prediction of mortality in Fournier's gangrene. *European Journal of Trauma and Emergency Surgery*. 2016;42(4):513-8
 23. Oymaci E, Coskun A, Yakan S, Erkan N, Uçar AD, Yıldırım M. Evaluation of factors affecting mortality in Fournier's gangrene: Retrospective clinical study of sixteen cases. *Turkish Journal of Surgery*. 2014;30(2):85-9.
 24. Korkut M, İçöz G, Dayangaç M, Akgün E, Yeniyay L, Erdoğan O, et al. Outcome analysis in patients with Fournier's gangrene: Report of 45 cases. *Diseases of the Colon & Rectum*. 2003;46(5):649-52.
 25. Yücel M, Özpek A, Başak F, Kılıç A, Ünal E, Yüksekdağ S, et al. Fournier's gangrene: A retrospective analysis of 25 patients. *Ulusal Travma ve Acil Cerrahi Dergisi*. 2017;23(5):400-4.
 26. Kuzaka B, Wroblewska MM, Borkowski T, Kawecki D, Kuzaka P, Młynarczyk G, et al. Fournier's Gangrene: Clinical Presentation of 13 Cases. *Medical Science Monitor*. 2018;24:548-55.
 27. Sorensen MD, Krieger JN. Fournier's gangrene: epidemiology and outcomes in the general US population. *Urologia Internationalis*. 2016;97(3):249-59.
 28. 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(5):1052-7.
 29. Ruiz-Tovar J, Córdoba L, Devesa JM. Prognostic factors in Fournier gangrene. *Asian Journal of Surgery*. 2012;35(1):37-41.
 30. Thwaini A, Khan A, Malik A, Cherian J, Barua J, Shergill I, et al. Fournier's gangrene and its emergency management. *Postgraduate Medical Journal*. 2006;82(970):516-9.
 31. Lauerman MH, Kolesnik O, Sethuraman K, Rabinowitz R, Joshi M, Clark E, et al. Less is more? Antibiotic duration and outcomes in Fournier's gangrene. *Journal of Trauma and Acute Care Surgery*. 2017;83(3):443-8.