

Research article

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# Diagnosis and treatment outcomes of Fournier's gangrene from a tertiary hospital

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## Abstract

**Introduction**  
Fournier's gangrene (FG) is a severe necrotizing fasciitis, caused by polymicrobial agents. This study aims to evaluate the clinical and paraclinical characteristics, treatment outcomes, and factors related to mortality in patients with FG at People's Hospital 115.

## Methods

A retrospective cohort study was conducted on all adult patients diagnosed with FG at People's Hospital 115 from January 2018 to October 2024. Data analysis was performed using SPSS version 26.0 (IBM, USA). Frequencies and percentages were used to present categorical data, while medians and interquartile ranges were used to express numerical variables.

## Results

A total of 60 patients (47 males and 13 females) were enrolled with the mean age was  $58.2 \pm 12.6$  years. The most common infection origins were from skin infections (36.7%), followed by the gastrointestinal tract (31.7%) and the genitourinary tract (30%). Most patients presented with symptoms such as perineal pain (98.3%), perianal swelling (91.7%), fever (48.3%), lower abdominal fluid collection (43.3%), and purulent discharge or perineal necrosis (31.7%). The most prevalent risk factors were diabetes mellitus (61.8%). Pathogenic bacteria could be isolated that were commonly *Escherichia coli*, *Klebsiella*, and *Proteus species*.

Treatment involved both medical management (resuscitation, broad-spectrum antibiotics, wound care) and surgical interventions (debridement, necrotic tissue excision, fecal and urinary diversion). The overall mortality rate was 18.3%. Factors significantly associated with mortality included advanced age, female sex, a history of long-term corticosteroid use, underlying malignancies, high severity index scores, and the need for permanent fecal diversion via colostomy.

## Conclusion

FG is an uncommon urological emergency which is a rapidly progressing disease with a high mortality rate. Early detection and aggressive treatment approaches to achieve better outcomes.

**Key words:** Fournier's gangrene, necrotizing fasciitis.

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## 1. INTRODUCTION

Fournier's gangrene (FG) was first described by the French dermatologist, Dr. Alfred Fournier. This disease is known as necrotizing fasciitis which is characterized

by the rapid spread of intense inflammatory and infectious processes along fascial planes that affect nearby soft tissue. That leads to blood vessels thrombosis which causes ischemia and tissue necrosis of the

adjacent soft tissue and fascia. As a result, the disease may not be noticed or recognized at first because there may not be any skin symptoms in its early stages [1,2].

Pathogenic bacteria are usually polymicrobial aerobic and anaerobic synergistic infections of the fascia and subcutaneous soft tissue which originate from the skin, gastrointestinal tract, or the urinary tract. Nevertheless, about 25% of cases have no identified cause. FG could progress to sepsis or septic shock leading to a high fatality rate of 40%. The treatment of FG requires a multimodal approach, emphasizing three fundamental principles: aggressive resuscitation, broad-spectrum antibiotic therapy, and radical surgical debridement of necrotic and infected tissues [2].

In this paper, we aim to assess the clinical features and treatment outcomes of patients with the diagnosis of FG. Besides, we evaluate the factors as the predictors of mortality due to FG.

## 2. METHODS

This is a retrospective cohort study. We analyzed all adult patients who were admitted to People's Hospital 115 with the diagnosis of FG from January 2018 to October 2023. The exclusive criteria were incomplete records. This study's procedures involving human subjects were carried out with the approval of the ethical standards of Pham Ngoc Thach University of Medicine (1032/TĐHYKPNT-HĐĐĐ).

Data were processed and analyzed using SPSS version 26.0 (IBM, USA). Quantitative variables were presented as mean  $\pm$  standard deviation (SD), while qualitative variables were reported as percentages. Statistical hypothesis testing was performed using the chi-square test ( $\chi^2$ ) for categorical variables and the t-test for comparing mean values between groups. A p-value  $< 0.05$  was

considered statistically significant.

## 3. RESULTS

A total of 60 patients were diagnosed FG, including including 47 male and 13 female patients. The age range was 31–87 years, with a mean age of  $58.2 \pm 12.6$  years. Regarding the comorbidities, diabetes mellitus was the most frequently associated comorbidity, present in 61.7% of cases. Other notable risk factors included a history of anorectal disease and prolonged corticosteroid use (15%), followed by obesity and malnutrition (11.7%), and chronic alcoholism (10%). The most common symptoms observed in the majority of cases were scrotal, perineal, or labial pain (98.3%) and erythema, swelling, and warmth of the scrotum or vulva (91.7%). Additional symptoms included fever (48.3%), subcutaneous emphysema (43.3%), purulent discharge from the scrotum, vulva, or labia majora (31.7%), and tachycardia (31.7%). The signs of necrotic tissues including necrosis of the scrotum, vulva, or labia majora were found in 44% of cases, and penile skin necrosis was the least common at 5%. 10 cases had an affected area of less than 3%, 32 cases had an area between 3–5%, and 18 cases had an area exceeding 5%. In our study, the most common source of infection in Fournier's gangrene was of cutaneous origin, accounting for 36.7% of cases, followed by anorectal sources (31.7%) and genitourinary sources (30%). The cause remained unidentified in 1.6% of cases.

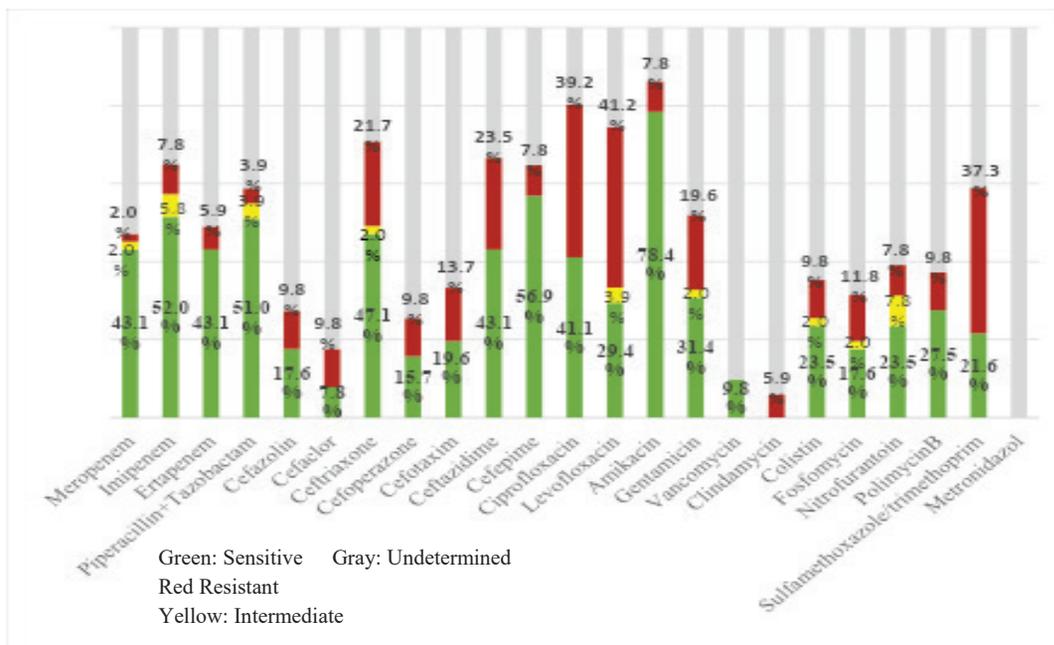
Among the 60 cases, 9 cultures were negative, 2 samples were lost, 2 cases isolated two types of bacteria, and 47 cases isolated a single bacterial strain. We analyzed 51 culture-positive samples, with Gram-negative bacteria being the most prevalent, accounting for 82.4% (42/51), including: *Escherichia coli*: 37.3%, *Klebsiella spp.*: 25.5%, *Proteus*

*spp.*: 17.6%, *Acinetobacter* and *Pseudomonas*: 2.0%. Gram-positive bacteria accounted for 17.6% (9/51), including: *Staphylococcus aureus*: 7.8%, *Streptococcus spp.*: 5.9%, *Enterococcus faecalis*: 2.0%. Among the *E. coli* isolates: ESBL-positive strains: 52.6% (10/19), ESBL-negative strains: 47.4% (9/19). Anaerobic bacteria were not isolated due to the limitations of the microbiology laboratory.

Regarding treatment outcomes, all cases underwent emergency surgical debridement. Among them, 46.7% of patients required urinary diversion via cystostomy, 26.7% underwent colostomy, and 3.3% underwent orchiectomy. Sepsis occurred in 48.3% of cases, septic shock in 16.7%, and multiple organ failure in 6.7%. The average hospital stay was 22 days, ranging from a minimum

of 2 to 63 days. The overall mortality rate was 18.3%. The antibiotic susceptibility chart showed that the highly sensitive antibiotics were Carbapenems, Aminoglycosides, and Piperacillin/Tazobactam (Figure 1). Empiric antibiotics therapy includes various antibiotics in the treatment of FG. The most frequent was Carbapenem or Piperacillin+Tazobactam plus Vancomycin or Amikacin and Metronidazole.

The prognostic factors associated with the mortality were illustrated in the table 1. Following that, age, female, the history of malignant diseases, prolonged use of corticosteroids, FG severity index, and septic shock were significantly associated to the mortality due to FG ( $p < 0.05$ ).



**Figure 1.** General characteristics of the antibiotic susceptibility of isolate bacteria

**Table 1.** The prognostic factors of mortality due to FG

Factors		Survivors	Mortality	p
Age	Below 40y (n=7)	7/7 (100.0%)	0/7 (0.0%)	0.005
	40-70 y (n=44)	38/44 (86.4%)	6/44 (13.6%)	
	Over 70y (n=9)	4/9 (44.4%)	5/9 (55.6%)	

Gender	Male (n=47)	41/47 (87.2%)	6/47 (12.8%)	0.034
	Female (n=13)	8/13 (61.5%)	5/13 (38.5%)	
Diabetes mellitus	Yes (n=38)	30/38 (78.9%)	8/38 (21.1%)	0.483
	No (n=22)	19/22 (86.4%)	3/22 (13.6%)	
Prolonged use of corticosteroids	Yes (n=9)	4/9 (44.4%)	5/9 (55.6%)	<0.001
	No (n=51)	45/51 (88.2%)	6/51(11.8%)	
Malignant diseases (lung cancer, colorectal cancer and liver cancer)	Yes (n=3)	1/3 (33.3%)	2/3 (66.7%)	0.026
	No (n=57)	48/57 (84.2%)	9/57 (15.8%)	
Alcohol addiction	Yes (n=6)	5/6 (83.3%)	1/6 (16.7%)	0.913
	No (n=54)	44/54 (81.5%)	10/54 (18.5%)	
Fournier's gangrene severity index (FGSI)	Mean	4.4 ± 2.7	8.5 ± 1.0	<0.001
	FGSI ≥ 9	4 (8.2%)	7 ( 63.6%)	<0.001
	FGSI < 9	45 (91.8%)	4 (36.4%)	
qSOFA score	qSOFA<2	31/49 (63.2%)	4/11 (36.4%)	0.964
	qSOFA≥2	18/49 (36.7%)	7/11(63.6%)	
Sepsis	Yes (n=29)	22/29 (75.9%)	7/29 (24.1%)	0.261
	No (n=31)	27/31 (87.1%)	4/31 (12.9%)	
Septic shock	Yes (n=10)	5/10 (50.0%)	5/10 (50.0%)	0.005
	No (n=50)	44/50 (88.0%)	6/50 (12.0%)	
Area of perineal necrosis	< 3% (n=10)	9/10 (90.0%)	1/10 (10.0%)	0.682
	3 - 5% (n=32)	25/32 (78.1%)	7/32 (21.9%)	
	> 5% (n=18)	15/18 (83.3%)	3/18 (16.7%)	

#### 4. DISCUSSION

Fournier's gangrene (FG) is a relatively rare form of infective necrotizing fasciitis of the perineal, genital, or perianal regions, which commonly affects men, but can also occur in women and children [3]. In this study, we also recorded a higher prevalence in male patients (47 males to 13 females), consistent with previous studies.

The prevalence of this disease is relatively lower in females than males (the ratio male/female: 10/1) due to better drainage of the perineal region in women through vaginal secretions [4]. The comorbidities involved diabetes mellitus, chronic alcohol abuse, and other immunocompromised states. The diagnosis was established clinically and confirmed through imaging studies.

The most common clinical symptoms were easily recorded which were genital pain, swelling, and black discoloration [3]. Among the causative microorganisms isolated from purulent discharge, the gram-negative bacteria prevailed, especially *E. Coli* was the most common (37.3%). Kuo et al and Basoglu et al. also reported 30% - 60% of cases that could isolate at least two types of bacteria, and *E. Coli* was still predominant [5,6]. With our laboratory conditions, anaerobic bacteria could not be isolated which was a limitation in this study.

The course of treatment involved immediate surgical debridement and the administration of broad-spectrum antibiotics that were customized to target the particular causative bacterium that was developed in the tissue culture that was obtained. This required timely treatments through a multidisciplinary team approach that includes, among others, urologic, general surgeons, nurses, emergency department doctors, infectious disease experts, and intensive care units. Regarding the formulation of empiric antibiotics administration, the combination of Carbapenem or Piperacillin+Tazobactam and Vancomycin or Amikacin and Metronidazole was frequently utilized in our study. These antibiotics still had high sensitivity in the antibiotic susceptibility chart. Similarly, Alasker et al. reported the most frequently used empirical antibiotics were Piperacillin/tazobactam, Vancomycin, and Meropenem. Tailored antibiotic agents used after culture results was mostly Piperacillin/tazobactam and Meropenem [6].

Although the worldwide advances in the treatment, the mortality rate for FG has generally remained about 15 – 40% [7]. In our study, the mortality rate was 18.3%. Our findings highlighted that several factors including age, female gender, prolonged use

of corticosteroids, underlying malignancies, high severity index scores, and septic shock could relate to worsened outcomes. Patient prognosis declines with advancing age. Because elder patients could have more comorbidities, age-related immune decline, and decreased physiological resilience leading to poorer recovery. Despite the lower prevalence of female patients compared to males, females had inferior results, with significantly greater rates of sepsis, multiorgan failure, and fatality. Abbasi et al. hypothesized that the higher incidence of morbid obesity and urinary tract infections in females were considered factors contributing to missed timely diagnoses and delayed debridement [4].

The Fournier Gangrene Severity Index (FGSI) was developed by Laor et al. in 1995 which is useful in determining the prognosis for FG. The components of the index include temperature, heart rate, respiratory rate, serum potassium and sodium, creatinine, bicarbonate levels, hematocrit, and white blood count. A score of greater than 9 was associated with a mortality of greater than 75 percent, while patients with a score of less than 9 had a 78 percent chance of survival [8]. Septic shock is a life-threatening complication of FG, the mortality rate in the septic shock group was high at 25% following Yang et al [9].

## 5. CONCLUSION

FG is a surgical urological emergency that could progress rapidly to sepsis and septic shock with a high fatality rate. FG is a clinical diagnosis with no laboratory or imaging results that can reliably exclude this condition. Prompt diagnosis, recognition of severe prognostic factors, and timely multimodal treatment help to reduce mortality.

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