

Fulminant Fournier's gangrene in a 39-year-old male sailor with poorly controlled diabetes mellitus: A case report

Putu Chandra Wibawa,*¹ Anak Agung Anom Wiradana,¹ Agung Ngurah Rai Kusuma Putra²

¹Department of Surgery, Udayana Teaching Hospital, Faculty of Medicine, Udayana University, Bali, Indonesia

²Department of Surgery, Warmadewa Teaching Hospital, Faculty of Medicine, Warmadewa University, Bali, Indonesia

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*Corresponding author:

chandra.wibawa@unud.ac.id

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Case Report

ABSTRACT

Fournier's gangrene is an uncommon yet potentially fatal form of necrotising fasciitis that involves the genital, perineal, and perianal regions, with mortality rates approaching 40%. We describe a case involving a 39-year-old male sailor who presented after 10 days of progressive scrotal swelling that had extended to the buttocks, along with purulent discharge, intense pain, and fever. The patient had a background of poorly managed diabetes mellitus and chronic alcohol use. On physical examination, necrotic changes were noted in the scrotal and perianal areas. Laboratory findings revealed elevated white cell count, hyperglycemia, hyponatremia, hypokalemia, and hypoalbuminemia. Culture results identified *Proteus mirabilis* and *Klebsiella pneumoniae* subspecies pneumoniae. Emergency surgical debridement and necrotomy were performed, followed by antibiotic therapy (ceftriaxone and metronidazole), fluid replacement, pain management, and insulin administration. This case underscores the critical need for early recognition and timely surgical treatment in managing Fournier's gangrene, especially in patients with risk factors such as diabetes and alcohol use. Occupational demands that delay medical consultation may worsen disease severity and complicate therapeutic efforts.

INTRODUCTION

Fournier's gangrene is a distinct variant of necrotising fasciitis marked by the rapid destruction of both superficial and deep tissues in the genital, perianal, anal, and scrotal regions. First identified by Jean Alfred Fournier in 1883, this condition continues to pose a major challenge in emergency care and surgical management due to its aggressive progression and substantial mortality risk.¹ Current data indicate an overall mortality rate of around 20.41% in large patient series. However, certain subgroups may experience rates approaching 40%, ranking this condition among the most fatal soft tissue infections encountered in medical practice.²

Fournier's gangrene is a rapidly progressive necrotising fasciitis caused by synergistic polymicrobial infection that spreads along fascial planes, leading to vascular thrombosis and extensive tissue necrosis.³ Although rare, accounting for approximately 0.02% of hospital admissions, its incidence is increasing in parallel with the rising prevalence of diabetes mellitus.⁴ Polymicrobial synergy has been shown to accelerate disease progression, facilitate wider anatomical spread, and complicate antimicrobial management due to mixed aerobic-anaerobic pathogens and emerging resistance patterns.⁵

Sorensen et al. showed that mixed aerobic-anaerobic infections were associated with wider anatomical involvement and prolonged hospitalization. On the other hand, mortality was more strongly influenced by comorbidities and the timing of surgical intervention.⁵ Molla et al. reported extensive disease with retroperitoneal extension requiring multiple debridements, focusing on anatomical severity rather than factors contributing to delayed presentation.⁶ Similarly, Zhang et al. identified laboratory severity indices and extent of tissue involvement as

key predictors of outcome, with mortality as the primary endpoint.⁷ In contrast, the present case highlights occupational delay as a non-biological factor that amplified synergistic infection and extensive disease progression, providing a distinct perspective within the existing literature.

The demographic profile shows a clear male predominance, with diabetes mellitus being the most common comorbidity among affected patients.⁸ Risk factors include advanced age (particularly over 50 years), male sex, diabetes mellitus, alcohol misuse, immunocompromised states, and recent surgical procedures.⁹ Although diabetes is a well-established risk factor, studies suggest it does not invariably lead to worse outcomes, provided that diagnosis and intervention are carried out promptly.¹⁰ Early recognition remains a major diagnostic challenge, as the initial symptoms may resemble benign conditions, like cellulitis or localized abscesses.¹¹

Recent case reports and reviews have predominantly focused on the extent and severity of tissue involvement in Fournier's gangrene. For example, Molla et al. described a case with retroperitoneal extension requiring multiple surgical debridements and intensive care management, emphasizing anatomical severity and fulminant disease progression.⁶ Other reports involving working-age patients, including manual labourers and industrial workers, have similarly highlighted clinical severity and outcomes but did not identify occupation itself as a barrier to timely medical access.^{8,12} In contrast, few studies have examined non-biological determinants such as occupational delay that may exacerbate disease progression through delayed presentation.

The present case underscores maritime-related occupational isolation as a critical factor amplifying synergistic infection, extensive tissue involvement, and systemic manifestations, thereby offering a unique perspective on how work-related circumstances can alter the clinical trajectory of Fournier's gangrene. By presenting this case, we aim to highlight the clinical and occupational determinants that can affect disease progression and outcomes, thereby contributing to a broader understanding of multidisciplinary and context-specific management strategies for Fournier's gangrene.

CASE DESCRIPTION

A 39-year-old male sailor presented to the emergency department with a 10-day history of progressive scrotal swelling that extended to the buttocks. The patient was employed as a long-distance maritime crew member and had been continuously at sea for approximately two weeks prior to presentation. During this period, several occupational barriers limited timely medical access, including geographical isolation, absence of onboard medical personnel, restricted availability of diagnostic facilities, and work-related reluctance to interrupt duties. As a result, early symptoms were not medically evaluated and were self-managed with over-the-counter analgesics. Purulent discharge developed approximately seven days after symptom onset, accompanied by severe genital pain and intermittent fever, prompting hospital presentation only after returning to shore.

The patient had a history of type 2 diabetes mellitus diagnosed three years prior, with poor glycaemic control due to irregular follow-up and inconsistent use of oral antidiabetic medication (metformin). He reported no prior insulin therapy. In addition, the patient consumed alcohol regularly, averaging 1–2 bottles of beer daily for more than ten years. He denied any history of recent trauma, surgery, perineal skin infection, or prior genitourinary disease.

On admission, the patient was alert and cooperative, with vital signs showing blood pressure 98/62 mmHg, pulse 112 beats/minute, respiratory rate 24 breaths/minute, temperature 38.6 °C, and oxygen saturation 95% on room air. General examination revealed mild dehydration with warm extremities and capillary refill time of less than two seconds. Local examination demonstrated marked scrotal swelling with purulent discharge and extensive necrotic tissue involving the scrotal, perineal, and perianal regions (Figure 1). The scrotal skin appeared dark brown to black with surrounding edema and induration. Palpation elicited significant tenderness, and crepitus was palpable over the scrotum and perineum, consistent with necrotising soft tissue infection.



Figure 1. Clinical picture of necrotic tissue in the scrotum, perineum, and perianal region accompanied by pus. (A) Inferior (bottom) view showing extensive necrosis and purulent discharge. (B) Left lateral view showing diffuse scrotal swelling and induration. (C) Superior (top) view showing darkened, devitalised scrotal skin with focal ulceration.

Laboratory results on admission were as follows: white blood cell count $23.62 \times 10^3/\mu\text{L}$ (neutrophils 87%), haemoglobin 11.2 g/dL, platelet $377 \times 10^3/\mu\text{L}$, random blood glucose 224 mg/dL, serum sodium 134 mmol/L, potassium 3.72 mmol/L, creatinine 1.2 mg/dL, blood urea nitrogen 35 mg/dL, and albumin 2.4 g/dL. Procalcitonin was 0.57 ng/mL. Microbiological culture from purulent material grew *Proteus mirabilis* (*P. mirabilis*) and *Klebsiella pneumoniae* (*K. pneumoniae*) subspecies *pneumoniae*. The isolates showed resistance to tetracycline, tigecycline, nitrofurantoin, and colistin for *P. mirabilis*, and to ampicillin and ticarcillin for *K. pneumoniae*.

The patient underwent emergency debridement and necrotomy under regional anaesthesia. Intraoperatively, extensive necrosis was found involving the scrotal and perianal fascia, and all devitalized tissue was excised with preservation of viable margins (Figure 2A). A handshoe drain was inserted for 3 days to maintain continuous drainage, and the wound was dressed daily with sterile gauze.



Figure 2. Clinical picture of Fournier's gangrene after necrotomy and debridement. (A) Frontal view showing extensive debridement of necrotic scrotal and perineal tissue with exposure of viable wound bed and placement of a handshoe drain. (B) posterior view showing postoperative wound with clean margins and drain extending to the perianal region.

Postoperatively, the patient received intravenous ceftriaxone 1 g every 12 hours and metronidazole 500 mg every 8 hours for 10 days, adjusted based on clinical improvement and wound cultures. Fluid resuscitation was administered with Ringer's lactate solution at 1500–2000 mL/day, titrated to urine output and hemodynamic status. Analgesia was provided with intravenous ketorolac 30 mg every 8 hours as needed. Insulin therapy was started to control

blood glucose levels, and wound care was continued with daily sterile dressing changes until healthy granulation tissue appeared.

DISCUSSION

This case highlights an underreported contributor to disease severity in Fournier's gangrene, namely, occupational barriers that delay access to medical care. Prolonged maritime deployment resulted in delayed presentation, allowing extensive fascial spread and advanced tissue necrosis at admission. While most published reports focus on anatomical extension, laboratory severity, or mortality outcomes, limited attention has been given to how occupational circumstances may exacerbate disease progression.⁸ By demonstrating the impact of maritime-related isolation and restricted healthcare access, this case provides a distinct perspective on how non-biological factors can significantly influence the clinical course and outcome of Fournier's gangrene.

The patient's metabolic and lifestyle factors further contributed to the aggressive disease course. He had poorly controlled diabetes mellitus and chronic alcohol consumption, averaging approximately 1–2 bottles of beer daily for more than ten years. Both conditions impair immune competence and wound healing, predisposing to necrotising fasciitis. The synergistic effect of diabetes and alcohol on infection risk has been described previously, but few studies have explored their combined impact alongside occupational isolation.^{13,14} These comorbidities likely worsened bacterial proliferation and tissue destruction. Despite the unusual delay, the patient's demographic profile is consistent with the established epidemiologic pattern, in which the disease predominantly affects males over 50 years of age, with an incidence of 3.3 per 100,000 men annually.²

Clinically, this case demonstrated the characteristic fascial plane spread of necrotising fasciitis, with extensive scrotal, perineal, and perianal necrosis accompanied by purulent discharge. Laboratory findings were consistent with a severe systemic inflammatory response and bacterial sepsis, reflecting significant metabolic derangement and capillary leak. Such biochemical abnormalities have been widely associated with increased disease severity and poorer clinical outcomes in large-scale reviews.¹⁵

Culture analysis revealed *Proteus mirabilis* and *Klebsiella pneumoniae* subspecies *pneumoniae*, resistant to several beta-lactams but sensitive to cephalosporins and metronidazole. The polymicrobial pattern observed here reflects the typical mixture of aerobic and anaerobic bacteria characteristic of Fournier's gangrene.¹⁶ *Escherichia coli* remains the most common lethal pathogen in global analyses, but mixed infections are more frequently associated with extensive necrosis rather than increased mortality when timely surgical management is performed.¹

Diagnosis of Fournier's gangrene remains predominantly clinical, although various prognostic tools have been developed to support early identification and severity assessment. While imaging modalities such as CT or ultrasound can delineate fascial involvement and identify gas or abscess pockets, they may delay urgent surgery.^{14,17,18} In the current case, the extent of necrosis was clinically evident, allowing immediate debridement. Early recognition and prompt operative management align with evidence that surgery performed within four hours of diagnosis significantly improves survival.^{7,18} Previous reports that incorporated preoperative imaging described longer time-to-intervention without a clear survival benefit, supporting the rationale for omitting imaging in rapidly progressive cases.⁶ Various prognostic tools have been developed to support early identification and severity assessment, including scoring systems such as the Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) and the Fournier's Gangrene Severity Index (FGSI), though both have recognized limitations. Recent studies have explored more precise biomarkers, with neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR), and monocyte-to-lymphocyte ratio (MLR) gaining attention, as elevated NLR and PLR values are associated with increased mortality risk.¹⁹

The management of Fournier's gangrene is fundamentally centred on early and aggressive surgical source control. In the present case, prompt radical debridement combined with culture-

guided broad-spectrum antimicrobial therapy proved effective in halting disease progression and preventing further systemic deterioration. This approach is consistent with emerging evidence that emphasizes immediate surgical intervention alongside empiric coverage against both aerobic and anaerobic pathogens, subsequently tailored according to culture and sensitivity results.²⁰ Recent studies have further suggested that shorter durations of antibiotic therapy may be sufficient following definitive debridement once adequate source control is achieved, thereby balancing clinical efficacy with principles of antimicrobial stewardship.²¹

The patient underwent emergency necrotomy and radical debridement under regional anaesthesia. This anaesthetic choice minimized physiological stress and hemodynamic fluctuation in a systemically ill, septic patient, consistent with recommendations for high-risk diabetic cases. The infected area was mapped using a three-zone classification: Zone 1 (necrotic tissue for complete excision), Zone 2 (infected but viable tissue), and Zone 3 (preserved healthy tissue), to ensure adequate but tissue-sparing debridement. Surgical management followed four essential phases: diagnostic confirmation with microbiological correlation, fascial delineation, radical excision, and meticulous wound care.¹⁴

Post-operative management addressed both local infection control and systemic stability. Fluid resuscitation with ringer's lactate corrected dehydration and improved perfusion.¹² Empiric broad-spectrum antimicrobial therapy with ceftriaxone 1 g IV q12h and metronidazole 500 mg IV q8h for 10 days provided coverage against both aerobic and anaerobic pathogens. This dual regimen is consistent with recommendations for mixed necrotising infections and comparable to carbapenem + clindamycin protocols described in multicentre cohorts.^{20,21} The selected combination was effective against the cultured organisms and cost-efficient in a resource-limited setting. Analgesia with ketorolac 30 mg IV q8h provided satisfactory pain control, an essential component of supportive therapy given the severe nociceptive and inflammatory pain characteristic of necrotising fasciitis.

Compared with Molla et al. who required five debridements and prolonged ICU admission, this patient achieved complete wound granulation by postoperative day 10 and discharge on day 14 after only one major debridement.⁶ This favourable outcome supports the growing body of evidence suggesting that shorter antibiotic courses (less than 48 hours after final debridement) can be sufficient when complete source control is achieved.^{21,22} Our patient's regimen exceeded this threshold because of initial systemic infection, but rapid clinical recovery indicates the efficacy of timely surgery and culture-guided antibiotics.

Studies consistently demonstrate that early and extensive surgical debridement is the primary determinant of survival.^{23,24} A few hours of delay increase mortality risk exponentially.⁷ The present case reaffirms that decisive clinical diagnosis, immediate operation, and appropriately targeted antibiotic therapy are key to reducing morbidity and preventing systemic sepsis. The absence of postoperative complications and early wound healing in this case exemplify the benefit of coordinated multidisciplinary management, combining surgical, infectious-disease, and metabolic control strategies.

The prognosis of Fournier's gangrene is influenced by several variables, including patient age, underlying health conditions, disease extent, and the speed of medical intervention.²³ Diabetes, immunosuppression, and advanced age remain major negative prognostic factors. Systematic reviews report an overall mortality rate around 20%, with female sex, fungal infection, and delayed presentation associated with higher mortality.²⁵ In this case, the patient survived despite multiple risk factors, suggesting that timely intervention can outweigh baseline comorbidity risks.

This case underscores the need for occupational health education in high-risk populations. Workers in remote or maritime environments may have limited healthcare access and low awareness of infection severity. Health education initiatives aimed at early symptom recognition and prompt medical consultation could prevent disease progression and improve prognosis in similar populations.¹⁸

This study demonstrates that occupational delay, metabolic comorbidities, and synergistic infection can dramatically influence the clinical course of Fournier's gangrene. Nevertheless, early

recognition, aggressive debridement, and rational dual-antibiotic therapy led to a favourable outcome. The findings support existing evidence that prompt surgical source control, even without radiological imaging, remains the cornerstone of management. By combining clinical decisiveness with tailored antibiotic stewardship, this case contributes a novel insight into the multifactorial determinants of Fournier's gangrene progression and recovery.

CONCLUSION

The severity of Fournier's gangrene may be influenced not only by metabolic comorbidities but also by occupational barriers that delay access to medical care. Maritime-related isolation in this patient was associated with delayed presentation and extensive disease progression. Nevertheless, early aggressive surgical debridement combined with culture-guided antimicrobial therapy was associated with a favourable outcome. Increased awareness of occupational barriers may support earlier presentation and improved management in high-risk patients.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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DATA AVAILABILITY STATEMENT

Clinical data derived from the medical records of Udayana Teaching Hospital. Data were obtained following hospital protocols and patient consent. The presentation of detailed patient information is limited to maintain patient confidentiality while providing educational value.

SUPPLEMENTARY MATERIAL(S)

No supplemental data.

AUTHORS CONTRIBUTIONS

PCW planned and managed the case, participated in data collection and analysis, and wrote and critically revised the manuscript. AAAW helped to manage the patient, analyze the case, and contributed to manuscript writing. ANRKP participated in patient management, data interpretation, and manuscript revision.

DECLARATION OF USING AI IN THE WRITING PROCESS

To enhance language clarity and grammar, AI tools (Google Translate and Grammarly) were employed for language improvement and editing assistance.

LIST OF ABBREVIATIONS

UDCA: Ursodeoxycholic Acid; MMP-9: Matrix Metalloproteinase-9; TIMP-1: Tissue Inhibitors of DM: diabetes mellitus; FGS: Fournier's Gangrene Severity Index; LRINEC: Laboratory Risk Indicator for Necrotising Fasciitis; WBC: white blood cell count; CRP: C-reactive protein; ICU: intensive care unit; IV: intravenous; mg/dL: milligrams per deciliter; mmol/L: millimoles per liter; g/dL: grams per deciliter.

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