



Surgical management and clinical outcomes in Fournier's gangrene: Our clinical experience

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ABSTRACT

Objective: Fournier's gangrene (FG) is a rapidly progressive necrotizing fasciitis of the perineal and genital regions with a high mortality rate. Although it is less common in women than in men, serious cases are reported. This study aimed to evaluate the clinical characteristics, laboratory findings, treatment processes, and outcomes of female patients diagnosed with FG in our center and to compare them with the existing literature.

Materials and Methods: Thirteen female patients diagnosed with FG between January 2010 and December 2024 were retrospectively reviewed. Demographic characteristics, comorbidities, sources of infection, laboratory parameters, surgical interventions, and clinical outcomes were recorded. All patients underwent emergency surgical debridement and broad-spectrum antibiotic therapy.

Results: The mean age of the patients was 60 years, and the most common comorbidity was diabetes mellitus (46.2%). The most frequent source of infection was perianal abscess (38.5%). The mean laboratory risk indicator for necrotizing fasciitis score was 8.1. More than half of the patients (53.8%) required multiple debridements, 30.7% underwent fecal diversion, and 46.1% required intensive care. One patient (7.6%) died due to severe sepsis and multiorgan failure.

Conclusion: FG in females, although rare, represents a life-threatening condition with high mortality. Early diagnosis, prompt initiation of treatment, and a multidisciplinary approach are critical determinants of survival. Careful evaluation of perineal infections in women with risk factors such as diabetes mellitus and obesity can be lifesaving.

Keywords: Fournier's gangrene; necrotizing fasciitis; multidisciplinary approach; mortality

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INTRODUCTION

Fournier's gangrene (FG) is an extremely rapidly progressing and life-threatening necrotizing fasciitis affecting the perineal, genital, and anorectal regions. Although first described in 1883 by Jean Alfred Fournier in young, healthy men, it has been established over the years that it can also occur in women.¹ The incidence in women is quite low, and far fewer cases have been reported in the literature compared to men. Although large series report a male-to-female ratio of approximately 10:1, increasing case reports in women in recent years have highlighted the growing importance of this group.²

The etiology of the disease is usually based on anorectal, urogenital, or skin-related infections. In women, perianal abscesses, urinary tract infections, and gynecological infections are among the triggering factors.³ Pathophysiologically, aerobic and anaerobic bacteria within the polymicrobial flora spread rapidly in the tissue, leading to small vessel thrombosis and tissue hypoxia. This mechanism results in progressive necrosis.⁴

The mortality rate in FG has been reported in the literature to be between 20% and 40%, and this rate has reached up to 70% in patients with sepsis at the time of presentation.^{2,4} Patients often require multiple surgical debridements, prolonged hospital stays, and reconstructive surgical interventions.⁵ Delays in the diagnosis of FG are associated with a more severe course and an increased risk of complications. Early diagnosis, aggressive surgical debridement, and broad-spectrum antibiotic therapy play a decisive role in survival. However, current data indicate a need for larger-scale studies, particularly in female patients.⁶ In our study, we aimed to contribute to the literature by evaluating the clinical characteristics, laboratory findings, treatment processes, and outcomes of female patients diagnosed with FG and treated at our clinic, and comparing our data with the literature.

MATERIALS AND METHODS

Our study is a single-center, retrospective cohort analysis. Female patients treated at our clinic with a diagnosis of FG between January 2010 and December 2024 were retrospectively reviewed. The study was conducted with the approval of the hospital ethics committee and was planned in accordance with the principles of the Helsinki Declaration. All data were obtained from the hospital electronic record system and patient files.

Female patients with a diagnosis of FG confirmed by clinical examination, laboratory findings, and radiological imaging were included in our study. Cases with limited skin necrosis due to trauma, patients under 18 years of age, and cases where the diagnosis or treatment process could not be adequately

evaluated due to missing file information were excluded from the study.

The age at presentation, body mass index (BMI), comorbidities (particularly diabetes mellitus, hypertension, obesity, malignancy, chronic renal failure), duration of symptoms, and clinical findings of all patients were retrospectively analyzed. Laboratory parameters included complete blood count, C-reactive protein (CRP), serum creatinine, electrolytes, blood glucose levels, and white blood cell count. In addition, the laboratory risk indicator for necrotizing fasciitis (LRINEC) score was calculated for all cases. Contrast-enhanced computed tomography was used in the vast majority of patients, and typical findings (fascial thickening, subcutaneous air, fluid collection) were evaluated for the diagnosis of necrotizing fasciitis. Ultrasonography and magnetic resonance imaging were used as complementary methods only in selected cases.

All patients underwent emergency surgical debridement at the time of diagnosis. During debridement, necrotic tissue was completely removed, and repeat debridement was performed when necessary. Fecal diversion (colostomy or Flexi-Seal system) was performed in some cases, and secondary reconstructive surgery (flap or skin graft) was required for large defects. Medical treatment initially involved a broad-spectrum antibiotic combination (usually carbapenem or third-generation cephalosporin + metronidazole ± aminoglycoside), followed by treatment adjustment based on culture and antibiogram results. Blood sugar regulation was ensured in diabetic patients, and patients requiring intensive care were monitored using a multidisciplinary approach. The primary endpoint in our study was defined as the mortality rate, while secondary endpoints were assessed as morbidity indicators (development of sepsis, number of repeat debridements, length of hospital stay, need for reconstructive surgery, complication rate).

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Ethics Committee of University of Health Sciences Türkiye, Kartal Dr. Lütfi City Hospital (approval no: 2025/010.99/20/26, date: 29.09.2025).

Statistical Analysis

Data were analyzed using SPSS Statistics (IBM Corp., Armonk, NY) software. Continuous variables were presented as mean ± standard deviation or median (minimum-maximum). Categorical variables were expressed as frequency and percentage values.

Student's t-test was used for parameters showing a normal distribution, and the Mann-Whitney U test was used for those not normally distributed. Categorical variables were compared using the chi-square or Fisher's exact test. Statistical significance was set at $p < 0.05$.

RESULTS

The mean age of the 13 female patients evaluated in our study was 60 years (range 45-74), and it is noteworthy that the vast majority were in the older age group. The mean BMI was calculated as 31.2 kg/m² and regarding BMI 6 patients (46.2%) were overweight (BMI 25.0-29.9 kg/m²), while 7 patients (53.8%) were obese (BMI ≥ 30.0 kg/m²) (Table 1). This finding supports the literature emphasizing obesity as an important risk factor for the development of FG.

When comorbidities were evaluated, type 2 diabetes mellitus was found to be the most common accompanying disease. A total of 6 patients (46.2%) had diabetes, and some of these cases were accompanied by additional diseases such as hypertension, obesity, or chronic renal failure. Hypertension was detected in 4 patients (30.8%), chronic obstructive pulmonary disease (COPD) in 2 patients (15.4%), and obesity in 2 patients (15.4%). Less commonly, chronic renal failure, a history of malignancy, and alcohol use were also among the risk factors (Table 1). This situation shows that FG in women often occurs in conjunction with metabolic and vascular risk factors.

The patients' presenting complaints usually began with non-specific symptoms such as pain, edema, and fever, while in advanced cases, necrosis in the vulvar or labial region became

prominent. It was observed that necrosis developed more rapidly in patients with accompanying factors such as diabetes and obesity.

When infection sources were evaluated, perianal abscess was found to be the most common cause. Details of other infection sources are provided in Table 1. These results reveal that FG in women often begins with perianal and vulvar infections, but less common gynecological and urinary causes can also lead to the condition.

Looking at the surgical treatment processes of the patients, the average number of debridements was 2.1 (range 1-4), and multiple surgical interventions were required in 7 patients (53.8%). Fecal diversion was performed in 4 patients (30.7%), and most of these patients also required intensive care support. Reconstructive surgery (flap or skin graft) was performed in three patients (23%). Laboratory findings showed a mean white blood cell count of $17.9 \times 10^3/\mu\text{L}$, mean CRP of 261 mg/L, creatinine of 1.8 mg/dL, and glucose level of 244 mg/dL. These values indicate the contribution of diabetes mellitus and sepsis to the clinical picture. The average LRINEC score was 8.1, with 6 patients classified as high risk (≥ 8).

The only mortality in the study occurred in a 72-year-old patient with a history of Type 2 DM and COPD. In this case, laboratory values were at their highest levels (CRP: 398 mg/L, creatinine: 3.2 mg/dL, glucose: 389 mg/dL), and the LRINEC score was calculated as 11. Details of the patients' surgical treatment processes and laboratory findings are provided in Table 2. When all cases were evaluated, sepsis developed in 7 patients (53.8%), and all of these cases required intensive care support. The hospital stay of

Table 1. Demographic and clinical characteristics of patients (n=13)

Patient no	Age (years)	BMI (kg/m ²)	Comorbidities	Complaint at presentation	Source of infection
1	45	27.8	DM Type 2, HT	Perineal pain, fever	Perianal abscess
2	52	32.4	Obesity	Vulvar pain, edema	Vulvar abscess
3	61	29.5	COPD, HT	Vulvar swelling, pain	Perianal abscess
4	48	34.2	Type 2 diabetes	Labial necrosis, fever	Bartholin abscess
5	67	26.9	Chronic renal failure	Perineal pain, sepsis	Urinary catheter
6	70	35.6	Type 2 diabetes, obesity	Vulvar necrosis	Vulvar abscess
7	59	28.1	Smoking, alcohol	Vulvar necrosis	Perianal abscess
8	63	31.7	History of malignancy	Perineal pain, fever	After radiotherapy
9	56	30.5	HT	Vulvar pain, edema	Perianal abscess
10	72	37.9	Type 2 diabetes, COPD	Labial necrosis, fever	Vulvar abscess
11	60	29.4	Type 2 diabetes	Vulvar necrosis	Urinary tract stone
12	74	33.5	HT, Type 2 DM	Perineal necrosis	Perianal abscess
13	53	27.6	Alcoholism	Vulvar edema, fever	Idiopathic

BMI: body mass index; DM: diabetes mellitus; HT: hypertension; COPD: chronic obstructive pulmonary disease

patients with sepsis was also significantly longer, calculated as an average of 29 days. In contrast, this period remained around 15 days on average in the group without sepsis.

The most common complications were wound site infection and delayed healing, detected in 4 patients (30.7%). Three patients developed progression of necrosis or flap necrosis, while two patients had concomitant renal dysfunction. The clinical outcomes of the patients in our study and the complications that developed during the treatment process are detailed in Table 3.

DISCUSSION

Our study shows that FG in female patients mostly occurs in association with advanced age, obesity, and diabetes mellitus,

that it rapidly progresses to necrosis despite non-specific initial complaints, and that the most common source of infection is perianal abscess. Our findings indicate that advanced age and metabolic comorbidities are important risk factors for the disease in women. Similarly, the literature indicates that the presence of diabetes mellitus, hypertension, and obesity plays a critical role in both the onset of the disease and the determination of mortality and morbidity rates.² Previous large e-series have also reported that diabetes is the most common accompanying risk factor and significantly increases mortality rates, similar to our study.^{1,7}

The incidence of FG in female patients is considerably lower than in males. Studies by Beecroft et al.⁵ and Khalid et al.⁸ have shown

Table 2. Surgical treatment processes and laboratory findings of patients (n=13)

Patient no	Number of debridements	Fecal diversion	Reconstructive surgery	Intensive care	White blood cell count (x10 ³ /μL)	CRP (mg/L)	Creatinine (mg/dL)	Glucose (mg/dL)	LRINEC score	Result
1	1	None	None	No	12.8	186	1.1	198	6	Lived
2	2	None	None	No	15.4	221	1.3	245	7	Lived
3	2	None	None	Yes	18.9	268	1.5	233	8	Lived
4	1	None	None	No	14.2	197	0.9	178	6	Lived
5	3	Yes	No	Yes	21.1	342	2.7	298	10	Lived
6	2	None	Yes	Yes	19.5	276	1.9	265	9	Lived
7	2	None	None	No	16.8	254	1.4	211	8	Lived
8	3	Yes	No	Yes	22.3	301	2.2	276	10	Lived
9	1	None	None	No	13.7	189	1.0	187	5	Lived
10	4	Yes	Yes	Yes	24.6	398	3.2	389	11	Exitus
11	2	None	None	Yes	17.5	263	1.8	228	8	Lived
12	3	Yes	Yes	Yes	20.8	327	2.5	312	10	Lived
13	1	None	None	No	11.9	178	1.0	174	5	Survived

CRP: C-reactive protein; LRINEC: laboratory risk indicator for necrotizing fasciitis

Table 3. Clinical outcomes and complications of patients (n=13)

Patient no	Sepsis	Intensive care requirement	Complications	Hospital stay (days)	Outcome
1	No	No	No wound infection	14	Experienced
2	No	No	Wound site infection	16	Experienced
3	Yes	Yes	Sepsis	24	Survived
4	No	No	Delayed wound healing	12	Experienced
5	Yes	Yes	Sepsis, kidney dysfunction	28	Survived
6	Yes	Yes	Sepsis, progression of necrosis	30	Survived
7	No	No	Local recurrence	18	Survived
8	Yes	Yes	Sepsis, delayed wound healing	34	Experienced
9	No	No	No wound infection	13	Experienced
10	Yes	Yes	Severe sepsis, multiple organ failure	41	Death
11	Yes	Yes	Sepsis, prolonged recovery	26	Survived
12	Yes	Yes	Sepsis, flap necrosis	29	Survived
13	No	No	Wound site infection	15	Experienced

that the disease is less common in women but can be as clinically severe as in men. In our series, the only mortality occurred in an elderly patient with a history of diabetes and COPD. This finding once again demonstrates the importance of comorbidities in determining prognosis. One of the most important characteristics of FG is its rapid progression and potential to develop into sepsis within a short period of time. In our study, the mortality rate was determined to be 7.6%. This result suggests that mortality can be kept low in our series through early diagnosis and rapid intervention. Our data also confirmed that complication rates are higher in patients presenting with a high LRINEC score. This situation once again highlights the importance of the LRINEC score in clinical prediction.⁹

The need for multiple debridements is an indicator of the invasive nature of the disease, as seen in our study. Chawla et al.¹⁰ emphasized that repeated surgical interventions are critically important for survival, and that incomplete or delayed debridement significantly increases mortality. The mean number of debridements in our study was 2.1, and more than one-third of these patients required fecal diversion. This finding is consistent with other studies in the literature.^{11,12} A multidisciplinary approach in the management of FG is one of the most important determinants of survival. The collaboration of intensive care specialists, infectious disease specialists, general surgeons, urologists, and gynecologists reduces both morbidity and mortality rates. Ozkan et al.⁹ have shown that such multidisciplinary approaches are life-saving, especially in elderly patients with comorbidities. In our series, thanks to the multidisciplinary approach, we achieved a successful clinical course with only one mortality.

While FG is generally reported in male patients, our study's focus solely on female patients fills an important gap in the literature. The 14-year retrospective time frame of our study allowed for long-term evaluation of the patients' clinical course. The fact that all patients were followed up and treated at the same center ensured homogeneity in the diagnostic and treatment protocols applied.

Study Limitations

This study has several limitations. First, the small sample size of only thirteen female patients limits the statistical power and generalizability of the results. Second, the retrospective and single-center design may have introduced selection bias, and some clinical or laboratory data might have been incomplete or missing. Third, because the study focused exclusively on female patients, comparisons with male patients regarding clinical presentation, management, and prognosis could not be performed.

CONCLUSION

In conclusion, FG is a rare but severe disease in women. Early diagnosis, prompt initiation of treatment, and multidisciplinary teamwork are key factors in reducing mortality and morbidity rates. Therefore, careful evaluation of infections developing in the perineal or vulvar region and prompt surgical intervention are of great importance, especially in female patients with risk factors such as diabetes and obesity. Mortality risk is significantly increased in patients with high LRINEC scores, emphasizing the importance of rapid evaluation of laboratory parameters.

ETHICS

Ethics Committee Approval: The study was approved by the Ethics Committee of University of Health Sciences Türkiye, Kartal Dr. Lütfi City Hospital (approval no: 2025/010.99/20/26, date: 29.09.2025).

Informed Consent: Retrospective study.

FOOTNOTES

Contributions

Surgical and Medical Practices: İ.B., F.Ş., M.M., T.T., B.A.S., Ö.A., H.M.Ü., C.Ö.G., Concept: İ.B., M.M., T.T., B.A.S., Ö.A., H.M.Ü., C.Ö.G., Design: İ.B., M.M., T.T., B.A.S., Data Collection or Processing: F.Ş., M.M., H.M.Ü., C.Ö.G., Analysis or Interpretation: İ.B., F.Ş., M.M., T.T., B.A.S., Ö.A., H.M.Ü., C.Ö.G., Literature Search: İ.B., F.Ş., T.T., B.A.S., Ö.A., H.M.Ü., C.Ö.G., Writing: F.Ş., M.M., T.T., B.A.S., Ö.A., H.M.Ü., C.Ö.G.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

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