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# Clinical Characteristics, Microbiological Profile, and Treatment Outcomes of Necrotizing Fasciitis and Fournier's Gangrene: A 10-Year Single-Center Experience

# Nekrotizan Fasiit ve Fournier Gangreninin Klinik Özellikleri, Mikrobiyolojik Profili ve Tedavi Sonuçları: On Yıllık Tek Merkez Deneyimi

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## Abstract

**Introduction:** To evaluate the clinical characteristics, microbiological profile, treatment strategies, and outcomes of adult patients with necrotizing fasciitis and Fournier's gangrene managed at İnönü University Turgut Özal Medical Center, Malatya, Türkiye over a 10-year period.

**Materials and Methods:** This retrospective, single-center cohort study included adult patients diagnosed with necrotizing fasciitis and/or Fournier's gangrene between January 2016 and December 2025. Demographic characteristics, clinical manifestations, laboratory findings, microbiological results, treatment approaches, and clinical outcomes were analyzed.

**Results:** Twenty-two patients were included. The median age was 56.5 years, and 63.6% were male. Necrotizing fasciitis accounted for 68.2% of cases, whereas Fournier's gangrene accounted for 31.8%. Diabetes mellitus was the most common comorbidity (36.4%). Swelling and erythema were present in all patients, whereas bullae and/or necrosis occurred in 72.7%. Microbiological cultures were positive in 68.2% of patients, with Gram-negative microorganisms being the most frequently isolated organisms; polymicrobial infection was identified in 18.2%. Surgical debridement was performed in 95.5% of patients, with a median time to the first debridement of 24 hours. Intensive care unit admission was required in 68.2% of patients, and vacuum-assisted closure therapy was applied in 40.9%. A complete clinical response was achieved in 54.5% of patients, whereas the in-hospital mortality rate was 9.1%.

**Conclusion:** Despite the high frequency of advanced disease requiring surgical intervention and intensive care support, favorable outcomes were achieved in most patients. Early surgical debridement, appropriate empirical antimicrobial therapy guided by local microbiological epidemiology, and multidisciplinary management remain essential components of optimal care for necrotizing soft tissue infections.

**Keywords:** Necrotizing fasciitis; Fournier's gangrene; necrotizing soft tissue infection; surgical debridement; polymicrobial infection

## Öz

**Giriş:** Bu çalışmada, üçüncü basamak bir referans merkezinde 10 yıllık dönemde izlenen nekrotizan fasiit ve Fournier gangrenli erişkin hastaların klinik özellikleri, mikrobiyolojik profilleri, tedavi yaklaşımları ve klinik sonuçlarının değerlendirilmesi amaçlandı.

**Gereç ve Yöntem:** Ocak 2016-Aralık 2025 tarihleri arasında nekrotizan fasiit ve/veya Fournier gangreni tanısıyla takip edilen erişkin hastalar retrospektif olarak incelendi. Demografik özellikler, klinik bulgular, laboratuvar verileri, mikrobiyolojik sonuçlar, tedavi yaklaşımları ve klinik sonuçlar değerlendirildi.

**Bulgular:** Çalışmaya 22 hasta dahil edildi. Ortanca yaş 56,5 yıl olup hastaların %63,6'sı erkekti. Olguların %68,2'si nekrotizan fasiit, %31,8'i Fournier gangreni tanısı aldı. En sık komorbidite diabetes mellitus (%36,4) idi. Şişlik ve eritem tüm hastalarda, bül ve/veya nekroz ise %72,7'sinde saptandı.



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Mikrobiyolojik kültürler hastaların %68,2'sinde pozitif olup etkenler arasında Gram-negatif mikroorganizmalar baskındı; polimikrobiyal enfeksiyon oranı %18,2 idi. Hastaların %95,5'ine cerrahi debridman uygulandı ve ilk debridmana kadar geçen ortalama süre 24 saattir. Yoğun bakım yatışı %68,2 hastada gerekli olurken, vakum yardımcı kapama tedavisi %40,9 hastada uygulandı. Kültür pozitif hastaların %73,3'ünde başlangıç ampirik antimikrobiyal tedavisinin uygun olduğu saptanırken, olguların %40,0'ında kültür ve duyarlılık sonuçlarına göre tedavi modifikasyonu yapıldı; bunlar de-eskalasyon, eskalasyon veya antifungal tedavi eklenmesini içeriyordu. Hastaların %54,5'inde tam klinik yanıt elde edilirken, hastane içi mortalite oranı %9,1 olarak bulundu.

**Sonuç:** İleri evre hastalık ve yüksek yoğun bakım gereksinimine rağmen olguların büyük kısmında olumlu klinik sonuçlar elde edildi. Erken cerrahi debridman, uygun ampirik antimikrobiyal tedavi, yerel mikrobiyolojik epidemiyolojinin dikkate alınması ve multidisipliner yaklaşım nekrotizan yumuşak doku enfeksiyonlarının başarılı yönetiminde temel unsurlar olmaya devam etmektedir.

**Anahtar Kelimeler:** Nekrotizan fasiit, Fournier gangreni, nekrotizan yumuşak doku enfeksiyonları, cerrahi debridman, polimikrobiyal enfeksiyon

## Introduction

Necrotizing soft tissue infections are rapidly progressive infections involving the skin, subcutaneous tissue, fascia, and, occasionally, muscle, and are associated with substantial morbidity and mortality. Among these infections, necrotizing fasciitis and Fournier's gangrene represent the most severe clinical forms, frequently necessitating extensive surgical debridement, intensive care support, and prolonged hospitalization. Despite advances in surgical techniques, antimicrobial therapy, and critical care management, these infections remain significant causes of adverse clinical outcomes worldwide<sup>[1-4]</sup>.

Early diagnosis remains challenging because the initial clinical presentation may resemble cellulitis, abscesses, or other uncomplicated soft tissue infections. Delayed recognition and treatment are associated with an increased risk of sepsis, organ failure, and death<sup>[5,6]</sup>. Diabetes mellitus, chronic kidney disease, malignancy, immunosuppression, trauma, and perineal or urogenital infections have been identified as major predisposing factors<sup>[7]</sup>. Characterization of the microbiological profile is essential for identifying polymicrobial infections, antimicrobial-resistant pathogens, and appropriate empirical antimicrobial coverage<sup>[8,9]</sup>.

The cornerstone of management includes prompt surgical debridement, early initiation of broad-spectrum antimicrobial therapy, intensive care support when necessary, and multidisciplinary collaboration<sup>[10,11]</sup>. Nevertheless, mortality rates remain considerable, and data regarding factors associated with clinical outcomes remain limited<sup>[12,13]</sup>. Furthermore, long-term studies comprehensively evaluating the clinical characteristics, microbiological findings, surgical management, and treatment outcomes of necrotizing fasciitis and Fournier's gangrene remain relatively scarce in Türkiye<sup>[14]</sup>.

This study aimed to evaluate the clinical characteristics, microbiological profiles, and treatment outcomes of patients with necrotizing fasciitis and Fournier's gangrene managed

over a 10-year period at İnönü University Turgut Özal Medical Center, Malatya, Türkiye and to provide real-world data regarding the management of these severe infections.

## Materials and Methods

### Study Design

This retrospective, single-center cohort study was conducted at İnönü University Turgut Özal Medical Center, Malatya, Türkiye. Adult patients diagnosed with necrotizing fasciitis and/or Fournier's gangrene between January 1, 2016, and December 31, 2025, were retrospectively evaluated.

### Study Population

Patients aged  $\geq 18$  years with a confirmed diagnosis of necrotizing fasciitis or Fournier's gangrene and available clinical, laboratory, microbiological, and treatment data were included. Patients with incomplete medical records, unconfirmed diagnoses, or non-infectious soft tissue disorders were excluded. The study cohort comprised patients who received multidisciplinary care during the study period.

### Ethics Approval

The study was approved by the İnönü University Ethics Committee (decision number: 2026/9970, date: 21.04.2026) and was conducted in accordance with the principles of the Declaration of Helsinki. Due to the retrospective and anonymized nature of the study, informed consent was waived.

### Definitions

The diagnosis of necrotizing fasciitis and Fournier's gangrene was established based on the clinical presentation, radiological findings when available, intraoperative findings, laboratory parameters, and microbiological investigations. Histopathological confirmation was available for 13 of the 22 patients (59.1%). In the remaining nine patients (40.9%), tissue specimens were not submitted for histopathological examination, and the diagnosis was established based on compatible clinical and radiological findings, together with

characteristic intraoperative findings documented during surgical debridement. Fournier's gangrene is defined as a necrotizing soft tissue infection involving the perineal and genital regions<sup>[12]</sup>. Septic shock was defined according to the Sepsis-3 criteria<sup>[13]</sup>.

### Clinical Outcomes

Clinical outcomes were categorized as complete response, partial response, or treatment failure. Complete response was defined as complete resolution of the clinical signs and symptoms of infection, accompanied by normalization of inflammatory markers and no further requirement for antimicrobial or surgical treatment. Partial response was defined as evident clinical improvement without complete recovery, accompanied by persistent laboratory evidence of inflammation and/or microbiological evidence of ongoing infection requiring continued antimicrobial therapy and/or additional surgical management. Treatment failure was defined as clinical progression, persistent evidence of infection despite appropriate medical and/or surgical treatment, or death. Mortality was defined as in-hospital death.

### Data Collection

Data were retrospectively obtained from electronic medical records, patient files, and institutional laboratory databases. Demographic characteristics, comorbidities, clinical manifestations, vital signs, laboratory findings, microbiological results, anatomical sites of infection, intensive care requirements, surgical interventions, adjunctive treatment modalities, length of hospital stay, complications, and clinical outcomes were recorded.

### Microbiological Assessment

Available wound, tissue, surgical specimen, and blood culture results were reviewed. Isolated microorganisms were classified as Gram-positive, Gram-negative, or anaerobic bacteria, and the presence of polymicrobial infection was recorded<sup>[11,12]</sup>. Because anaerobic cultures were not routinely performed during the study period, they were obtained only in selected cases based on clinical indications.

### Treatment and Surgical Management

Data regarding the timing and number of surgical debridements, additional surgical procedures, antimicrobial therapy, intensive care support, hyperbaric oxygen therapy, and vacuum-assisted closure (VAC) applications were collected. Early surgical debridement was defined as an intervention performed as soon as possible following diagnosis<sup>[12]</sup>. Empirical antimicrobial therapy consisted of a carbapenem, glycopeptide, and intravenous clindamycin in accordance with

the institutional treatment protocol for necrotizing soft tissue infections. The appropriateness of empirical antimicrobial therapy was evaluated among culture-positive patients based on whether the initial regimen included at least one antimicrobial agent active against the identified pathogen according to antimicrobial susceptibility testing. Antimicrobial therapy was subsequently continued unchanged or modified through deescalation, escalation, or addition of antifungal therapy according to microbiological findings and the clinical course.

### Outcome Measures

The primary outcome was in-hospital mortality. Secondary outcomes included clinical response, intensive care requirements, duration of hospitalization, number of surgical interventions, and development of complications.

### Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics software (IBM Corp., Armonk, NY, USA). Continuous variables were assessed for normality using the Shapiro-Wilk test and are presented as medians with interquartile ranges. Comparisons between groups were performed using the Mann-Whitney U test. Categorical variables are presented as frequencies and percentages and were compared using Fisher's exact test. Owing to the limited number of mortality events, multivariable analyses were not performed. A two-sided p value <0.05 was considered statistically significant.

## Results

### Baseline Characteristics

A total of 22 patients were included in the study. The median age was 56.5 years, and 14 patients (63.6%) were male. Based on the clinical diagnosis, 15 patients (68.2%) were classified as having necrotizing fasciitis and 7 (31.8%) as having Fournier's gangrene. Diabetes mellitus was the most common comorbidity, occurring in 36.4% of patients.

At presentation, swelling and erythema were observed in all patients, whereas bullae and/or necrosis were detected in 72.7%, severe or disproportionate pain in 50.0%, and hypotension/shock in 18.2% of patients. The median duration of symptoms before diagnosis was 7 days. Laboratory evaluation demonstrated a median leukocyte count of  $18.58 \times 10^9/L$ , a median C-reactive protein level of 19.5 mg/dL, and a median procalcitonin level of 2.34 ng/mL. Demographic, clinical, and laboratory characteristics of the study population are summarized in Table 1.

**Table 1.** Demographic, clinical, and laboratory characteristics of patients with necrotizing fasciitis and Fournier's gangrene.

| Variable                                 | n (%) or median (IQR) |
|------------------------------------------|-----------------------|
| Number of patients                       | 22                    |
| Age, years                               | 56.5 (45-68)          |
| Male sex                                 | 14 (63.6)             |
| Necrotizing fasciitis                    | 15 (68.2)             |
| Fournier's gangrene                      | 7 (31.8)              |
| Diabetes mellitus                        | 8 (36.4)              |
| Malignancy                               | 2 (9.1)               |
| Immunosuppression                        | 3 (13.6)              |
| History of trauma or wound               | 9 (40.9)              |
| Recent surgical history                  | 6 (27.3)              |
| History of perineal/urogenital infection | 7 (31.8)              |
| Symptom duration, days                   | 7 (3-10)              |
| Severe/disproportionate pain             | 11 (50.0)             |
| Swelling/erythema                        | 22 (100)              |
| Bullae/necrosis                          | 16 (72.7)             |
| Hypotension/shock                        | 4 (18.2)              |
| Leukocyte count ( $\times 10^9/L$ )      | 18.58 (11.71-27.10)   |
| CRP (mg/dL)                              | 19.5 (13.25-24.4)     |
| Procalcitonin (ng/mL)                    | 2.34 (0.73-4.19)      |
| Creatinine (mg/dL)                       | 1.10 (0.83-1.58)      |

Data are presented as n (%) or median (IQR). IQR, interquartile range; CRP, C-reactive protein.

### Microbiological Findings, Treatment Characteristics, and Clinical Outcomes

Wound or tissue cultures were obtained from 19 patients, with microbiological growth detected in 13 of 19 patients (68.4%). Gram-negative microorganisms predominated among the culture-positive isolates, whereas polymicrobial infection was identified in 18.2% of patients. Deep tissue involvement was observed in all patients, muscle involvement or myonecrosis in 72.7%, and perineal/genital involvement in 40.9%.

Among the 22 patients, 21 (95.5%) received empirical broad-spectrum antimicrobial therapy consisting of a carbapenem, glycopeptide, and intravenous clindamycin at diagnosis. Overall, positive microbiological cultures were identified in 15 patients, including 13 positive wound/tissue cultures and two blood cultures yielding *Candida parapsilosis*. The initial empirical antimicrobial regimen provided adequate coverage in 11 of the 15 culture-positive patients (73.3%). Culture-directed antimicrobial modification was required in six patients: therapy was de-escalated in two patients according to antimicrobial susceptibility results, escalated to colistin in two patients because of resistant Gram-negative pathogens, and supplemented with antifungal therapy in two

patients following the isolation of *Candida parapsilosis* from blood cultures. In the remaining patients, the initial empirical antimicrobial regimen was continued without modification for at least 14 days.

Surgical debridement was performed in 21 of 22 patients (95.5%). Surgical data for one patient transferred from an outside hospital were unavailable because the operative records could not be retrieved. The median number of debridement procedures was one. Intensive care admission was required in 15 patients (68.2%), and VAC therapy was applied in 9 patients (40.9%).

Complete clinical response was achieved in 54.5% of patients, whereas 36.4% demonstrated a partial response. Treatment failure occurred in 9.1% of patients despite appropriate medical and surgical management. The median length of hospital stay was 22 days, and complications developed in 36.4% of patients. Overall, in-hospital mortality was 9.1%. Because only two mortality events occurred during the study period, further comparative analyses of mortality were not performed. Detailed data are presented in Table 2.

## Discussion

Necrotizing fasciitis and Fournier's gangrene remain among the most severe bacterial infections encountered in clinical practice, frequently resulting in extensive tissue destruction, septic shock, intensive care admission, and death despite advances in modern medical care. In the present 10-year cohort, most patients presented with advanced disease characterized by deep tissue involvement, myonecrosis, and a high requirement for intensive care support. Nevertheless, the overall in-hospital mortality rate remained relatively low at 9.1%. This finding is noteworthy because the study population predominantly consisted of patients with advanced disease managed at İnönü University Turgut Özal Medical Center, Malatya, Türkiye using a multidisciplinary treatment approach. Taken together, our findings highlight the importance of early recognition, prompt surgical intervention, appropriate empirical antimicrobial therapy, and close multidisciplinary collaboration in the management of severe necrotizing soft tissue infections.

Mortality remains the most clinically relevant outcome in necrotizing soft tissue infections and continues to be reported at considerable rates worldwide. In a recent systematic review and meta-analysis, El-Qushayri et al.<sup>[10]</sup> reported mortality rates exceeding 20% among patients with Fournier's gangrene. Similarly, Hakkarainen et al.<sup>[14]</sup> reported mortality rates of approximately 16% across different forms of necrotizing soft tissue infections whereas Yilmazlar et al.<sup>[15]</sup> reported mortality approaching 28% among patients with severe Fourniers

**Table 2.** Microbiological findings, treatment characteristics, and clinical outcomes.

| Variable                                                 | n (%) or median (IQR) |
|----------------------------------------------------------|-----------------------|
| Microbiological findings                                 |                       |
| Wound/tissue culture obtained                            | 19 (86.4)             |
| Positive microbiological culture                         | 15 (68.2)             |
| Gram-negative pathogen                                   | 11 (50.0)             |
| Gram-positive pathogen                                   | 3 (13.6)              |
| Blood cultures positive for <i>Candida parapsilosis</i>  | 2 (9.1)               |
| Polymicrobial infection                                  | 4 (18.2)              |
| Extent of infection                                      |                       |
| Deep tissue involvement                                  | 22 (100)              |
| Muscle involvement or myonecrosis                        | 16 (72.7)             |
| Perineal/genital involvement                             | 9 (40.9)              |
| Treatment characteristics                                |                       |
| Surgical debridement†                                    | 21 (95.5)             |
| Time to first debridement, hours                         | 24 (15–24)            |
| Number of debridements                                   | 1 (1–2)               |
| VAC therapy                                              | 9 (40.9)              |
| Broad-spectrum empirical antimicrobial therapy initiated | 21 (95.5)             |
| Appropriate empirical antimicrobial therapy*             | 11 (73.3)             |
| Culture-guided antimicrobial modification                | 6 (40.0)              |
| • Deescalation*                                          | 2 (13.3)              |
| • Escalation to colistin*                                | 2 (13.3)              |
| • Addition of antifungal therapy*                        | 2 (13.3)              |
| Intensive care admission                                 | 15 (68.2)             |
| Clinical outcomes                                        |                       |
| Length of hospital stay, days                            | 22 (13–30)            |
| Complete clinical response                               | 12 (54.5)             |
| Partial clinical response                                | 8 (36.4)              |
| Treatment failure                                        | 2 (9.1)               |
| Complication                                             | 8 (36.4)              |
| Mortality                                                | 2 (9.1)               |

Data are presented as n (%) or median (IQR). \*Percentages for appropriate empirical antimicrobial therapy, culture-guided antimicrobial modification, deescalation, escalation, and addition of antifungal therapy were calculated using the 15 patients with positive microbiological cultures as the denominator. †One patient was referred from an outside hospital, and the operative records could not be retrieved; therefore, the surgical procedure performed before referral could not be verified. IQR, interquartile range; VAC, vacuum-assisted closure.

gangrene. In comparison, the in-hospital mortality rate in our cohort was 9.1%, despite the high frequency of deep tissue involvement, myonecrosis, and intensive care requirements. Although direct comparisons should be interpreted cautiously because of differences in patient populations, disease severity,

and study design, several characteristics of our management strategy may have contributed to these favorable outcomes. Surgical debridement was performed in nearly all patients, with a median time to first debridement of 24 hours after diagnosis, and empirical broad-spectrum antimicrobial therapy was initiated promptly in nearly all patients. Furthermore, empirical therapy provided adequate initial antimicrobial coverage in nearly three-quarters of culture-positive patients, with subsequent culture-guided optimization when indicated. Together with multidisciplinary management involving infectious diseases specialists, surgeons, and intensive care physicians, these factors may have facilitated timely therapeutic decision-making and close clinical monitoring throughout the disease course.

Diabetes mellitus was the most common comorbidity in our cohort, affecting 36.4% of patients. This finding is consistent with previous studies that have identified diabetes mellitus as a major predisposing factor for both necrotizing fasciitis and Fournier's gangrene<sup>[16]</sup>. Hyperglycemia-related impairment of neutrophil function, microvascular dysfunction, and reduced tissue perfusion may promote rapid bacterial proliferation and contribute to extensive soft tissue destruction. Benjelloun et al. similarly reported a more severe clinical course and higher complication rates among diabetic patients with Fournier's gangrene<sup>[17]</sup>. Likewise, Temoçin et al.<sup>[9]</sup> identified diabetes mellitus as the most common comorbidity in a contemporary Turkish cohort. Collectively, these findings emphasize the role of diabetes mellitus as an important host-related risk factor for the development and progression of necrotizing soft tissue infections. They also underscore the need for heightened clinical vigilance and early intervention in patients with diabetes mellitus who present with suspected necrotizing soft tissue infections.

The clinical manifestations observed in our study were largely consistent with the classical presentation of necrotizing soft tissue infections. Swelling, erythema, and necrotic skin changes were the predominant clinical findings, whereas severe or disproportionate pain was reported in half of the patients. This finding is clinically relevant because pain out of proportion to physical findings is widely recognized as a hallmark of necrotizing fasciitis; however, its absence does not exclude the diagnosis. Goh et al. emphasized that early-stage disease can closely mimic cellulitis or other uncomplicated soft tissue infections, potentially resulting in delayed diagnosis and treatment<sup>[18]</sup>. Consistent with this observation, the median duration of symptoms before diagnosis in our cohort was 7 days, suggesting that delayed presentation, delayed clinical recognition, or both may still occur despite increasing awareness of these infections. In conjunction with the markedly elevated inflammatory markers observed at presentation, these findings highlight the importance of maintaining a high index

of clinical suspicion and obtaining early surgical evaluation in patients with compatible risk factors and rapidly progressive soft tissue infections, even when classical clinical features are absent or incomplete.

One of the most notable microbiological findings of the present study was the predominance of Gram-negative microorganisms among culture-positive cases. Misiakos et al.<sup>[19]</sup> reported that Enterobacterales species constitute a substantial proportion of pathogens isolated from patients with necrotizing soft tissue infections, highlighting the importance of broad Gram-negative antimicrobial coverage during the initial management of these infections. Similarly, Cipriani et al.<sup>[20]</sup> found that Gram-negative organisms were frequently isolated from patients with Fournier's gangrene, although polymicrobial infections remained common in their multicenter cohort. In our cohort, Gram-negative pathogens constituted the largest microbiological group, whereas polymicrobial infections were less frequent than those reported in previous studies. This difference should be interpreted cautiously, as anaerobic cultures were not routinely performed during the study period, and prior antimicrobial exposure before microbiological sampling may have reduced the microbiological yield. In addition, the relatively high proportion of perineal and genital infections in our cohort may have contributed to the predominance of Gram-negative pathogens. From a therapeutic perspective, empirical broad-spectrum antimicrobial therapy provided adequate initial coverage in 73.3% of culture-positive patients, while culture-guided treatment modification was required in the remaining patients. These findings support current recommendations for prompt initiation of broad-spectrum empirical antimicrobial therapy, followed by timely optimization based on microbiological culture and antimicrobial susceptibility results.

The requirement for intensive care support was remarkably high in our cohort, affecting more than two-thirds of patients and reflecting the substantial physiological burden associated with extensive tissue destruction, systemic inflammation, and sepsis. Lin et al.<sup>[21]</sup> demonstrated that disease severity scoring systems may help identify patients at increased risk of adverse outcomes and facilitate early risk stratification in Fournier's gangrene. Similarly, Iacovelli et al. reported that adjunctive wound management strategies, such as VAC therapy, may provide additional benefits in selected patients after adequate surgical debridement<sup>[22]</sup>. Current international guidelines further emphasize that successful management of severe necrotizing soft tissue infections depends on early recognition, prompt source control, broad-spectrum empirical antimicrobial therapy, and appropriate intensive care support when indicated<sup>[23]</sup>. In our cohort, despite the high rate of

intensive care admission, the overall in-hospital mortality rate remained relatively low. Although the limited number of mortality events precludes definitive conclusions, these findings suggest that timely multidisciplinary management incorporating early surgical intervention, appropriate antimicrobial therapy, and intensive care support may contribute to favorable clinical outcomes. Nevertheless, the high rate of intensive care utilization also underscores the substantial healthcare resources required to manage these life-threatening infections.

### Strengths and Clinical Implications

This study provides a 10-year real-world overview of the clinical characteristics, microbiological profile, treatment strategies, and outcomes of patients with necrotizing fasciitis and Fournier's gangrene managed at a tertiary referral center. The inclusion of detailed microbiological data, empirical antimicrobial treatment patterns, and culture-guided therapeutic modifications provides clinically relevant insights into the management of these life-threatening infections. Our findings underscore the importance of prompt surgical intervention, appropriate empirical antimicrobial therapy informed by local microbiological epidemiology, and multidisciplinary management to optimize patient care.

### Study Limitations

This study has several limitations. First, its retrospective, single-center design may have introduced selection bias and limited the generalizability of the findings. Second, the relatively small sample size reduced the statistical power to identify independent predictors of adverse outcomes and precluded multivariable analyses. Third, because anaerobic cultures were not routinely performed, the frequency of polymicrobial and anaerobic infections may have been underestimated. Nevertheless, the 10-year study period and the availability of detailed clinical, microbiological, and treatment data provide valuable real-world insights into the management of these uncommon but life-threatening infections.

## Conclusion

Necrotizing fasciitis and Fournier's gangrene remain life-threatening infections that require prompt recognition and multidisciplinary management. Our findings underscore the importance of early surgical debridement, appropriate empirical antimicrobial therapy informed by local microbiological epidemiology, and timely optimization of treatment based on culture results. Larger, multicenter studies are warranted to validate these findings and further improve the management of necrotizing soft tissue infections.

## Ethics

**Ethics Committee Approval:** The study was approved by the İnönü University Ethics Committee (decision number: 2026/9970, date: 21.04.2026) and was conducted in accordance with the principles of the Declaration of Helsinki.

**Informed Consent:** Due to the retrospective and anonymized nature of the study, informed consent was waived.

## Footnotes

### Authorship Contributions

Surgical and Medical Practices: A.K., A.H.K., F.M., S.A.T., Z.B.Y., Z.Ç., Concept: A.K., Design: A.K., A.H.K., S.A.T., Data Collection or Processing: A.H.K., Z.B.Y., Z.Ç., Analysis or Interpretation: A.K., A.H.K., F.M., S.A.T., Z.B.Y., Z.Ç., Literature Search: A.K., A.H.K., S.A.T., Writing: A.K., A.H.K., S.A.T.

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