

ORIGINAL RESEARCH

Analysis of the Clinical Pattern and Factors Associated with Morbidity and Mortality in Necrotizing Fasciitis in a tertiary care centre: A retrospective study

Dr. V. Uma Maheswari^{1*}, Dr. N. Suganthi², Dr. D. Karthikeyan², Dr. S. Srividya²

¹Associate Professor, Department of General Surgery, Government Medical College, Tiruppur, Tamil Nadu.

²Assistant Professor, Department of General Surgery, Government Medical College, Tiruppur, Tamil Nadu

Corresponding Author

Dr. V. Uma Maheswari

Associate Professor, Department of General Surgery, Government Medical College, Tiruppur, Tamil Nadu

Received: 30 November, 2023

Accepted: 07 January, 2024

ABSTRACT

Background: Necrotizing fasciitis (NF) is a life-threatening soft tissue infection characterized by rapid tissue necrosis and systemic toxicity. Early recognition and aggressive management are crucial for improving patient outcomes; however, the clinical patterns and prognostic factors of NF remain poorly understood. **Methods:** A retrospective observational study was conducted at Government Medical College Tiruppur, analyzing the medical records of 77 patients with features suggestive of NF admitted between May 2021 and December 2023. Demographic characteristics, clinical presentation, outcomes, and associated risk factors were analyzed. Statistical analysis was performed to identify factors associated with morbidity and mortality in NF patients. **Result:** Among the study cohort, predominantly female (68.83%) patients with a mean age of 62.22 years were observed. Swelling of limbs was the most common presenting feature (73.68%), with a mortality rate of 18.18%. Diabetes mellitus (68.83%) and trauma (15.79%) were significant risk factors associated with adverse outcomes ($p < 0.05$). **Conclusion:** NF remains a formidable challenge with significant morbidity and mortality. Early recognition, aggressive management, and identification of risk factors such as diabetes mellitus and trauma are crucial for improving patient outcomes.

Key words: Necrotizing fasciitis, clinical patterns, prognosis, risk factors, mortality, retrospective study.

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INTRODUCTION

Necrotizing fasciitis (NF) stands as a harrowing testament to the relentless onslaught of infectious pathology within the realm of soft tissue infections. Its ominous presence has been documented since the seminal observations made by Jones in 1871, marking the inception of a saga fraught with peril and uncertainty⁽¹⁾. However, it was not until the 1950s that the term "necrotizing fasciitis" was coined by Wilson, encapsulating the essence of a condition characterized by the insidious necrosis of fascial planes and subcutaneous tissues, while sparing the deeper musculature⁽²⁾. This designation, though seemingly innocuous, belies the ferocity of the affliction it represents, heralding a cascade of events culminating in rapid tissue destruction, systemic toxicity, and the specter of gross morbidity and mortality⁽³⁾.

The clinical landscape of NF is marred by its elusive nature, often shrouded in ambiguity until the precipice of irreversible decline is upon the afflicted individual.

Despite the advent of modern medical technology and diagnostic modalities, the diagnosis of NF remains a daunting challenge, with the condition frequently masquerading as benign cellulitis until the telltale signs of systemic deterioration emerge⁽⁴⁾. This diagnostic quagmire underscores the paramount importance of timely recognition and decisive intervention, with early surgical exploration and debridement representing the cornerstone of effective management. Accompanying this surgical imperative is the mandatory initiation of antibiotic therapy, aimed at curbing the relentless advance of microbial assailants and staving off the inexorable march towards morbidity and mortality⁽⁵⁾.

Within the crucible of NF management lies an intricate interplay of clinical variables and prognostic determinants, each wielding a palpable influence on the trajectory of disease progression and ultimate patient outcomes. The present retrospective study seeks to forge new pathways of understanding,

delving into the depths of clinical data to unravel the enigmatic tapestry of NF⁽⁶⁾. By dissecting the clinical patterns and elucidating the factors precipitating adverse outcomes, this study aims to furnish clinicians with the insights necessary for informed decision-making and therapeutic optimization.

The goals of this study are many-sided, each one carefully crafted to understand a different part of the NF puzzle. First, we want to explore the various symptoms and how the disease progresses over time. This will help us spot NF early and treat it sooner. We'll list all the signs and symptoms of NF to help doctors diagnose it better and avoid delaying treatment, which can be bad. Alongside our look at symptoms, we're also aiming to figure out what factors predict how bad NF will get and if it might lead to death. We'll dig into data about patients, like their age, medical history, and test results, to find these hidden clues. By doing this, we hope to give doctors a heads-up about patients who might have a rough time with NF, so they can plan treatments better and improve how well patients do.

MATERIALS AND METHODS

Study Design: This retrospective observational study aimed to analyze the clinical patterns and factors associated with morbidity and mortality in patients diagnosed with Necrotizing Fasciitis (NF). Medical records and clinical data of patients admitted to Government Medical College Tiruppur between May 2021 and December 2023 were retrospectively collected and analyzed.

Data Collection: Following approval from the Institutional Ethical Committee, a total of 77 case sheets of patients with features suggestive of NF were selected for inclusion in the study. Clinical data and demographic characteristics, including sex, age, body mass index (BMI), education, occupation, underlying diseases, and vital signs within the first day of admission and after 48–72 hours, were retrieved from inpatient charts. Additionally, pertinent data related to the investigation and treatment of NF, such as wound appearance, site of infection, organisms involved, and laboratory data within the first day of admission and after 48–72 hours, as well as details of surgical interventions and outcomes, were extracted from medical records.

Risk Factor Assessment: A comprehensive assessment of risk factors associated with NF was conducted based on available literature and clinical expertise. Identified risk factors included diabetes, chronic diseases, use of immunosuppressive drugs (e.g., prednisolone), malnutrition, age over 60 years, intravenous drug misuse, peripheral vascular disease, renal failure, underlying malignancy, and obesity.

Symptom Evaluation: Symptoms of NF were evaluated based on documented evidence and clinical observations. Early symptoms, which can often be ambiguous and develop rapidly, include a red, warm, or swollen area of skin that spreads quickly, severe pain extending beyond the affected skin area, and fever. Later symptoms may manifest as ulcers, blisters, or black spots on the skin, changes in skin color, pus or oozing from the infected area, dizziness, fatigue, and gastrointestinal symptoms such as diarrhea or nausea.

Data Analysis: Descriptive statistical analysis was performed to summarize demographic characteristics, clinical presentation, and outcomes of patients with NF. Associations between demographic, clinical, and laboratory variables with morbidity and mortality were assessed using appropriate statistical tests, including chi-square tests, t-tests, or Mann-Whitney U tests, as applicable. A p-value < 0.05 was considered statistically significant.

Ethical Considerations: This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Informed consent was waived due to the retrospective nature of the study, and patient data confidentiality was strictly maintained throughout the research process.

RESULT

A total of 77 patients admitted to Government Medical College Tiruppur between May 2021 and December 2023 with features suggestive of Necrotizing Fasciitis (NF) were included in the study. The demographic characteristics, clinical presentation, outcomes, and associated risk factors were analyzed to elucidate patterns and factors contributing to morbidity and mortality in NF patients.

The study cohort comprised predominantly female patients (68.83%), with a mean age of 62.22 years (SD = 10.89). The age distribution ranged from 11 to 86 years, with most patients falling within the age range of 60 to 70 years.

The most common presenting feature among NF patients was swelling of limbs, reported in 73.68% of cases. Other prevalent symptoms included cellulitis (23.68%), acute encephalopathy (1.32%), sepsis (5.26%), gangrene (5.26%), and penile extension (1.32%). Notably, several patients presented with multiple symptoms concurrently (Table 1).

Table 1: Clinical presentation and outcome of NF patients

Presentation Feature	Frequency (%)
Swelling of limbs	57 (73.68%)
Cellulitis	18 (23.38%)
Acute encephalopathy	1 (1.30%)

Sepsis	4 (5.19%)
Gangrene	4 (5.19%)
Penile extension	1 (1.30%)

Of the 77 NF patients included in the study, 14 patients (18.18%) succumbed to the disease, while the remaining 63 patients (81.82%) survived. Death was primarily attributed to complications associated with NF, such as sepsis, acute kidney injury (AKI), and cardiovascular diseases (CAD).

Diabetes mellitus (DM) emerged as the most prevalent risk factor among NF patients, identified in 68.83% of cases. Other notable risk factors included chronic diseases (26.32%), trauma (15.79%), cirrhosis (7.89%), and atherosclerosis (7.89%) (Table 2).

Table 2: Prevalence of risk factors among NF patients

Risk Factor	Frequency (%)
Diabetes mellitus	53 (68.83%)
Chronic diseases	20 (26.32%)
Trauma	12 (15.79%)
Cirrhosis	6 (7.89%)
Atherosclerosis	6 (7.89%)

Statistical analysis revealed a significant association between certain risk factors and adverse outcomes in NF patients. Patients with DM were found to have a significantly higher mortality rate compared to those without DM ($p < 0.05$). Similarly, the presence of trauma as a risk factor was significantly associated with increased mortality ($p < 0.05$). However, no significant association was observed between other risk factors, such as chronic diseases, cirrhosis, and atherosclerosis, and mortality in NF patients.

The clinical course of NF varied among patients, with some experiencing rapid deterioration leading to death within a few days of admission, while others exhibited a more protracted course with gradual resolution of symptoms following aggressive treatment interventions, including surgical debridement and antibiotic therapy.

DISCUSSION

Necrotizing fasciitis (NF) remains a challenging and life-threatening condition, characterized by rapid tissue necrosis and systemic toxicity. The predominance of female patients in our study cohort aligns with previous reports indicating a higher incidence of NF among women, possibly due to factors such as hormonal influences, anatomical differences, or predisposing comorbidities. The mean age of 62.22 years highlights NF as a condition affecting primarily older individuals, consistent with the notion that age-related physiological changes and comorbidities contribute to increased susceptibility to severe infections⁽⁷⁾.

Swelling of limbs emerged as the most common presenting feature of NF, followed by cellulitis, sepsis, and gangrene. This spectrum of clinical manifestations underscores the diverse and often insidious nature of NF, which can initially mimic less severe conditions such as cellulitis, leading to delayed diagnosis and treatment initiation⁽⁸⁾. Early recognition of NF remains a critical challenge in clinical practice, as highlighted by the varied and nonspecific symptoms observed in our study cohort.

The overall mortality rate of 18.18% among NF patients underscores the grave prognosis associated with this condition. Despite advancements in medical and surgical management, NF continues to carry significant morbidity and mortality, emphasizing the need for continued vigilance and prompt intervention. The high mortality rate observed in our study aligns

with previous reports and underscores the importance of early diagnosis, aggressive surgical debridement, and antimicrobial therapy in improving survival outcomes⁽⁹⁾.

Diabetes mellitus (DM) emerged as the most prevalent risk factor among NF patients, consistent with previous studies demonstrating the association between DM and increased susceptibility to severe infections. The immunocompromised state, microvascular complications, and impaired wound healing associated with diabetes predispose individuals to NF and contribute to worse outcomes. The significant association between DM and mortality in our study reinforces the importance of glycemic control and aggressive management of comorbidities in NF patients with diabetes⁽¹⁰⁾.

Furthermore, trauma emerged as a notable risk factor for NF in our study cohort. Traumatic injuries disrupt the skin barrier and provide a portal of entry for pathogens, increasing the risk of soft tissue infections such as NF. The association between trauma and mortality highlights the importance of thorough wound care, early recognition of signs of infection, and prompt intervention to prevent the progression to NF in trauma patients^(9, 10).

While our study identified DM and trauma as significant risk factors for adverse outcomes in NF patients, other comorbidities such as chronic diseases, cirrhosis, and atherosclerosis did not show a significant association with mortality. This finding underscores the complex interplay of host factors,

microbial virulence, and disease severity in determining outcomes in NF patients. Further research is warranted to elucidate the role of these comorbidities and their impact on NF prognosis.

The varied clinical course of NF observed in our study reflects the heterogeneity of this condition and underscores the importance of individualized management strategies. While some patients experienced rapid deterioration and succumbed to the disease despite aggressive treatment, others exhibited a more favorable response to therapy with gradual resolution of symptoms. The effectiveness of surgical debridement and antimicrobial therapy in halting disease progression and improving outcomes highlights the cornerstone of treatment in NF management^(7,9).

Our study has several limitations that warrant consideration. Firstly, the retrospective nature of the study introduces inherent biases and limitations associated with reliance on medical records for data collection. Secondly, the relatively small sample size may limit the generalizability of our findings to broader populations. Additionally, the single-center nature of the study may limit the external validity of the results. Future studies with larger sample sizes and multicenter collaborations are needed to validate our findings and further elucidate the complex interplay of factors influencing NF outcomes.

CONCLUSION

This study provides valuable insights into the clinical patterns, outcomes, and associated risk factors of NF patients. The findings underscore the importance of early recognition, aggressive management, and identification of prognostic indicators to improve

patient outcomes in NF. Continued efforts to raise awareness, enhance diagnostic capabilities, and optimize treatment strategies are essential in mitigating the morbidity and mortality associated with this devastating condition.

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