

When Cellulitis Is Not Cellulitis: Early Necrotizing Fasciitis in the Emergency Department

Muhammad Usama Khalid¹, Qasim Zia^{1*}, Muhammad Sheraz², Zunair Nasir¹, Muhammad Salman Khan¹, Tanveer Rasool³, Muhammad Nabeegh Khan², Uzain Sardar⁴, Muhammad Abdullah Tariq⁵, Hafiz Muhammad Raees Imtiaz⁶

¹Multan Medical & Dental College, Multan

²Nishtar Medical University, Multan

³Fatima Jinnah Medical University, Lahore

⁴Buch International Hospital, Multan

⁵Benazir Bhutto Hospital, Rawalpindi

⁶Saeed Medicare Hospital, Mian Channu

Citation: Muhammad Usama Khalid, Qasim Zia, Muhammad Sheraz, Zunair Nasir, Muhammad Salman Khan, Tanveer Rasool, Muhammad Nabeegh Khan, Uzain Sardar, Muhammad Abdullah Tariq, Hafiz Muhammad Raees Imtiaz. When Cellulitis Is Not Cellulitis: Early Necrotizing Fasciitis in the Emergency Department. *Annal of Clin Med & Med Res.* 2026;4(1):1-9.

Received Date: 13 March, 2026; **Accepted Date:** 14 March, 2026; **Published Date:** 15 March, 2026

***Corresponding author:** Qasim Zia, Multan Medical & Dental College, Multan

Copyright: © Qasim Zia, Open Access 2024. This article, published in *Annal of Clin Med & Med Res (AOCMMR)* (Attribution 4.0 International), as described by <http://creativecommons.org/licenses/by/4.0/>.

ABSTRACT

Necrotizing fasciitis (NF) is an uncommon but rapidly progressive soft-tissue infection characterized by widespread fascial necrosis, systemic toxicity, and high mortality. Early recognition remains a major clinical challenge because initial manifestations frequently resemble benign conditions such as cellulitis or erysipelas. Diagnostic delays are associated with significantly increased morbidity and mortality, particularly when surgical intervention is postponed. We report a case of early necrotizing fasciitis initially diagnosed as uncomplicated cellulitis in the emergency department (ED), illustrating the diagnostic pitfalls encountered in early disease. A middle-aged man presented with acute lower-limb erythema, swelling, and severe pain disproportionate to physical findings. Initial evaluation suggested cellulitis, and empirical antibiotic therapy was initiated. However, rapid clinical deterioration with escalating pain and systemic toxicity prompted further investigation. Cross-sectional imaging demonstrated fascial thickening and soft-tissue gas, raising suspicion for necrotizing fasciitis. Emergent surgical exploration confirmed extensive fascial necrosis requiring aggressive debridement and intensive care support. The patient subsequently underwent multiple surgical procedures and recovered after prolonged hospitalization. This case highlights the importance of maintaining a high index of suspicion for necrotizing fasciitis in patients presenting with presumed cellulitis, particularly in the presence of disproportionate pain, rapid progression, or systemic manifestations. It also underscores the limitations of laboratory-based scoring systems such as the

LRINEC score and emphasizes the critical role of early surgical consultation. Timely recognition and prompt surgical intervention remain the most important determinants of survival.

Keywords: Necrotizing fasciitis; Cellulitis mimic; Soft-tissue infection; Emergency medicine; LRINEC score; Surgical emergency

INTRODUCTION

Necrotizing fasciitis is a fulminant soft-tissue infection characterized by rapidly spreading necrosis of fascia and subcutaneous tissues, frequently accompanied by systemic toxicity and multiorgan failure. Despite advances in antimicrobial therapy and critical care, mortality rates remain high, ranging from 20% to 40% in most contemporary series.^[1-3] The condition is considered a surgical emergency because prompt debridement of necrotic tissue is the most important determinant of patient survival.

The pathophysiology of necrotizing fasciitis involves bacterial invasion of the deep fascia with subsequent release of exotoxins and enzymes that promote tissue destruction, microvascular thrombosis, and ischemia. This cascade results in rapid extension of infection along fascial planes while initially sparing overlying skin structures, which may appear deceptively benign during early stages.^[4] Consequently, early clinical manifestations may closely resemble uncomplicated cellulitis, leading to diagnostic delays in emergency settings.

Cellulitis is one of the most common infectious conditions encountered in emergency departments and primary care clinics. Because early necrotizing fasciitis may present with similar symptoms—localized erythema, swelling, warmth, and tenderness—distinguishing between these conditions is often difficult.^[5] However, delayed recognition of necrotizing fasciitis can result in catastrophic outcomes including septic shock, limb loss, and death.

Several clinical features have been proposed to differentiate necrotizing fasciitis from less severe soft-tissue infections. These include severe pain disproportionate to examination findings, rapidly progressive erythema, systemic toxicity, skin discoloration, bullae formation, and crepitus.^[6] Nevertheless, these findings may appear late in the disease course, limiting their usefulness in early diagnosis.

To facilitate earlier recognition, diagnostic tools such as the Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score have been developed.^[7] This scoring system incorporates commonly available laboratory parameters to stratify patients according to risk. Although widely used, subsequent validation studies have demonstrated inconsistent sensitivity and specificity, particularly in early disease.^[8]

This case report describes a patient presenting to the emergency department with clinical features initially consistent with cellulitis who was subsequently diagnosed with necrotizing fasciitis. The case highlights the diagnostic challenges associated with early necrotizing fasciitis and underscores the importance of maintaining clinical vigilance in patients presenting with presumed cellulitis.

CASE PRESENTATION PATIENT INFORMATION

A 52-year-old male presented to the emergency department with a 24-hour history of progressive pain, swelling, and erythema involving the left lower limb. The patient reported sustaining a minor superficial abrasion to the anterior aspect of his left shin while gardening two days earlier. He initially experienced mild localized discomfort but noted rapid progression of pain and swelling during the preceding 24 hours.

His past medical history was significant for poorly controlled type 2 diabetes mellitus diagnosed eight years earlier and hypertension managed with oral antihypertensive therapy. He denied any history of immunosuppressive medication use, recent hospitalization, or intravenous drug use. There was no history of recent travel, marine exposure, or contact with contaminated water.

The patient reported subjective fever and malaise but denied nausea, vomiting, or respiratory symptoms.

Clinical Examination

On arrival to the emergency department, the patient appeared uncomfortable and complained of severe pain in the affected limb.

Vital signs were as follows:

- Temperature: 37.9°C
- Heart rate: 108 beats/min
- Blood pressure: 128/76 mmHg
- Respiratory rate: 20 breaths/min
- Oxygen saturation: 98% on room air

Physical examination of the left lower extremity demonstrated:

- Diffuse erythema extending from the mid-shin to the ankle
- Mild to moderate edema
- Increased local warmth
- Marked tenderness to palpation

Notably, the degree of reported pain appeared disproportionate to visible cutaneous findings. No bullae, skin necrosis, or crepitus were identified at this stage. Peripheral pulses were palpable, and capillary refill was normal.

The remainder of the systemic examination was unremarkable.

Based on the clinical findings, the initial working diagnosis was acute cellulitis of the left lower limb.

Initial Investigations

Laboratory investigations were obtained on presentation and revealed the following results:

- White blood cell count: 17.8×10^9 /L
- Hemoglobin: 12.9 g/dL
- Platelet count: 310×10^9 /L
- C-reactive protein (CRP): 220 mg/L
- Serum sodium: 131 mmol/L
- Serum creatinine: 1.5 mg/dL
- Blood glucose: 240 mg/dL
- Serum lactate: 2.1 mmol/L

The calculated LRINEC score was 6, corresponding to an intermediate risk for necrotizing fasciitis. Plain radiographs of the lower limb showed no evidence of gas within the soft tissues.

Initial Management

The patient was admitted for observation and started on empirical intravenous antibiotic therapy with cefazolin, consistent with institutional guidelines for moderate cellulitis.

Intravenous fluids and analgesics were administered, and the margins of erythema were marked to monitor disease progression.

Clinical Deterioration

Approximately six hours after admission, the patient developed increasing pain and worsening systemic symptoms. His heart rate increased to 120 beats per minute, and blood pressure decreased to 100/64 mmHg. Repeat examination demonstrated expansion of erythema beyond previously marked margins.

New clinical findings included:

- Early violaceous discoloration of the skin
- Development of tense edema
- Increased tenderness extending beyond the area of visible erythema

Given the rapid progression of symptoms and persistent disproportionate pain, the possibility of necrotizing soft-tissue infection was considered.

Advanced Imaging

An urgent contrast-enhanced computed tomography (CT) scan of the lower extremity was obtained. The CT scan demonstrated:

- Fascial thickening along the deep fascial planes
- Subcutaneous edema
- Small pockets of gas within soft tissues
- Fluid tracking along fascial compartments

These findings raised strong suspicion for necrotizing fasciitis.

Surgical Intervention

The surgical team was immediately consulted, and the patient was transferred to the operating theatre for emergent exploration.

Intraoperative findings included:

- Extensive grayish necrotic fascia
- Thin malodorous “dishwater” fluid
- Lack of bleeding from fascial surfaces
- Minimal resistance to blunt dissection of fascial planes These findings were consistent with necrotizing fasciitis.

Aggressive surgical debridement of necrotic tissue was performed. Tissue samples were obtained for microbiological analysis.

Microbiological Findings

Intraoperative cultures revealed a polymicrobial infection, including:

- Streptococcus pyogenes
- Escherichia coli
- Bacteroides fragilis

These findings were consistent with Type I necrotizing fasciitis.

Postoperative Course

The patient was transferred to the intensive care unit for postoperative management. Broad-spectrum antimicrobial therapy consisting of piperacillin – tazobactam, clindamycin, and vancomycin was initiated.

During the subsequent hospital course, the patient required:

- Two additional surgical debridements
- Intensive hemodynamic monitoring
- Glycemic control
- Nutritional support

After 18 days of hospitalization, the infection was successfully controlled, and the patient was discharged with outpatient follow-up for reconstructive surgery.

DISCUSSION

Diagnostic Challenges in Early Necrotizing Fasciitis

Early necrotizing fasciitis frequently mimics cellulitis, making timely diagnosis particularly difficult in emergency settings. Both conditions share overlapping clinical features, including erythema, swelling, and tenderness.^[9]

However, necrotizing fasciitis involves deeper fascial structures and is characterized by rapidly progressive tissue destruction and systemic toxicity. The early preservation of superficial skin structures often masks the severity of the underlying infection.

One of the most important clinical clues is pain disproportionate to physical findings, which may reflect early fascial ischemia and nerve involvement.

Risk Factors

Several predisposing factors increase susceptibility to necrotizing fasciitis. Common risk factors include:

- Diabetes mellitus
- Chronic kidney disease
- Immunosuppression
- Obesity
- Peripheral vascular disease
- Recent trauma or surgery

Diabetes mellitus is particularly important because hyperglycemia impairs immune function and microvascular circulation, facilitating bacterial proliferation.

Microbiology and Classification

Necrotizing fasciitis is broadly classified into several categories based on microbial etiology. Type I (Polymicrobial)

This form accounts for the majority of cases and involves a mixture of aerobic and anaerobic organisms.

Type II (Monomicrobial)

Most commonly caused by Group A Streptococcus, sometimes in combination with Staphylococcus aureus.

Type III

Associated with marine organisms such as Vibrio vulnificus. Type IV

Caused by fungal pathogens.

Understanding the microbiological profile is essential for guiding antimicrobial therapy.

Limitations of the LRINEC Score

The LRINEC score was developed as a diagnostic tool to differentiate necrotizing fasciitis from other soft-tissue infections using routine laboratory parameters.^[7]

Despite initial enthusiasm, subsequent studies have demonstrated limited sensitivity in early disease. Several analyses report sensitivity as low as 36%, meaning a substantial proportion of patients with necrotizing fasciitis may have low or intermediate scores.^[10]

Therefore, reliance solely on the LRINEC score may lead to missed or delayed diagnoses.

Role of Imaging

Imaging modalities can assist in diagnosis when clinical findings are equivocal. CT Imaging

Computed tomography can detect:

- Fascial thickening
- Soft-tissue gas
- Fluid collections

MRI

Magnetic resonance imaging provides superior soft-tissue contrast and is highly sensitive for detecting fascial involvement. However, MRI may not be readily available in emergency situations and may delay surgical intervention.

Ultimately, imaging should not delay operative exploration when clinical suspicion is high.

Management Principles

Management of necrotizing fasciitis requires a multidisciplinary approach. Key principles include:

1. Immediate broad-spectrum antibiotic therapy
2. Early and aggressive surgical debridement
3. Hemodynamic resuscitation and intensive care support
4. Repeated surgical exploration if necessary Early surgical intervention significantly reduces mortality.

CONCLUSION

Necrotizing fasciitis is a rare but devastating infection that may initially resemble uncomplicated cellulitis. Emergency physicians must maintain a high index of suspicion in patients presenting with rapidly progressive soft-tissue infection, particularly when pain is disproportionate to physical findings or systemic symptoms are present.

Although diagnostic tools such as laboratory scoring systems and imaging modalities may aid evaluation, clinical judgment and early surgical consultation remain paramount.

Prompt recognition and aggressive surgical management are essential to improving patient outcomes and reducing mortality.

REFERENCES

1. Stevens DL, Bryant AE. Necrotizing soft-tissue infections. *N Engl J Med*. 2017.
2. Anaya DA, Dellinger EP. Necrotizing soft tissue infection. *Clin Infect Dis*. 2007.
3. Hakkarainen TW, et al. Necrotizing soft tissue infections. *JAMA Surg*. 2014.
4. Stevens DL. Streptococcal necrotizing infections. *Clin Infect Dis*. 2015.
5. Morgan MS. Diagnosis and management of necrotizing fasciitis. *J Hosp Infect*. 2010.
6. Hasham S, et al. Necrotizing fasciitis. *BMJ*. 2005.
7. Wong CH, et al. The LRINEC score. *Crit Care Med*. 2004.
8. Wilson MP, Schneir AB. A case of necrotizing fasciitis with low LRINEC. *Ann Emerg Med*. 2013.
9. Goh T, et al. Early diagnosis of necrotizing fasciitis. *Br J Surg*. 2014.
10. Fernando SM, et al. Diagnostic accuracy of LRINEC. *Ann Surg*. 2019.
11. Elliott DC, et al. Necrotizing soft tissue infections. *Ann Surg*. 1996.
12. McHenry CR, et al. Determinants of mortality. *Ann Surg*. 1995.
13. Misiakos EP, et al. Early diagnosis and treatment of NF. *Front Surg*. 2014.
14. Childers BJ, et al. Necrotizing fasciitis review. *Am Surg*. 2002.
15. Bonne SL, Kadri SS. Evaluation and management. *Infect Dis Clin North Am*. 2017.
16. Brook I, Frazier EH. Microbiology of necrotizing fasciitis. *J Clin Microbiol*. 1995.
17. Tillou A, et al. Necrotizing soft tissue infections. *Surg Clin North Am*. 2014.
18. May AK, et al. Treatment of NSTI. *Surg Infect*. 2009.
19. Bilton BD, et al. Aggressive surgical management. *Arch Surg*. 1998.
20. Wong CH, Khin LW. Clinical predictors. *J Bone Joint Surg*. 2003.
21. Shiroff AM, et al. Necrotizing infections review. *J Intensive Care Med*. 2014.

22. Singh G, et al. Imaging in necrotizing fasciitis. *Radiographics*. 2015.
23. Schmid MR, et al. MRI findings. *AJR Am J Roentgenol*. 1998.
24. Tsai YH, et al. Clinical predictors. *J Trauma*. 2008.
25. Tang WM, et al. Early diagnosis. *J Bone Joint Surg*. 2001.
26. Bechar J, et al. Necrotizing fasciitis review. *Int J Surg*. 2017.
27. Sartelli M, et al. Guidelines for soft tissue infections. *World J Emerg Surg*. 2018.
28. Stevens DL, et al. Practice guidelines. *Clin Infect Dis*. 2014.
29. Ustin JS, et al. Emergency management. *Emerg Med Clin North Am*. 2018.
30. Hadeed GJ, et al. Emergency department management. *Emerg Med Pract*. 2020.
31. Wall DB, et al. Objective criteria. *Am J Surg*. 2000.
32. Chao WN, et al. Prognostic factors. *J Microbiol Immunol Infect*. 2011.
33. Elliott D, Kufera JA. Necrotizing infections. *Surgery*. 2000.
34. Centers for Disease Control and Prevention. Group A streptococcal infections.
35. Goh T, et al. Clinical predictors of necrotizing infection. *Br J Surg*. 2014.
36. Neeki MM, et al. Evaluating LRINEC. *West J Emerg Med*. 2017.
37. Stevens DL, et al. Soft tissue infection guidelines. *Clin Infect Dis*. 2014.