



Occult Presentation of Necrotizing Fasciitis With Subtle Clinical Findings: A Case Report

Urgent Message: Necrotizing fasciitis may present without visible soft tissue abnormalities. Therefore, clinical signs and symptoms—including localized pain and tachycardia—are findings that should warrant further clinical investigation.

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Citation: Finch M, Ommert B, Nazir Z, Weinstock MB. Occult Presentation of Necrotizing Fasciitis With Subtle Clinical Findings: A Case Report. *J Urgent Care Med.* 2026;20(10):33-37

Keywords: necrotizing fasciitis; urgent care; soft tissue infection; leg pain; deep vein thrombosis; pain out of proportion; tachycardia; septic shock

Abstract

Introduction: Necrotizing fasciitis (NF) is a severe, rapidly progressing soft tissue infection. Early NF may present to urgent care without visible soft tissue abnormalities. As such, clinical signs and symptoms, including localized pain with tachycardia, should warrant further clinical investigation.

Case Presentation: A 43-year-old male presented to the emergency department (ED) with right posterior knee pain for 3 days. He denied redness, swelling, pitting edema, chest pain, shortness of breath, or local tenderness. Four days prior, he had been treated for influenza-like illness at an urgent care (UC) center and was prescribed oseltamivir. From the ED, he was discharged and scheduled for an outpatient ultrasound (US) due to suspicion for a deep vein thrombosis (DVT). However, he returned to the ED the following morning, complaining of worsening leg pain and new swelling.



Physical Exam: The physical exam during his first ED visit was remarkable only for tachycardia. During the following morning's ED visit, a physical exam revealed worsening tachycardia, unilateral leg swelling, calf tenderness, and mottled skin discoloration of the medial malleolar region.

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Final Diagnosis: The patient continued to decline after arriving at the ED. Computed tomography revealed diffuse subcutaneous and intermuscular fascial edema consistent with NF. Operative debridement demonstrated infection extension into his thorax. He developed worsening septic shock, organ failure, and cardiac arrest. He later died. The final diagnosis was necrotizing soft tissue infection that resulted in septic shock with multi-organ failure and death.

Resolution: Despite aggressive management, the patient died within 24 hours. The case later proceeded to litigation and was settled before trial.

Conclusion: It is important that clinicians maintain a broad differential and recognize concerning elements of history or exam that may warrant further workup or emergent referral to a higher level of care.

Introduction

Necrotizing fasciitis (NF) is an infection characterized by rapid progression of soft tissue necrosis, pain out of proportion to physical exam, crepitus, erythema, and edema. While some cases of NF include skin discoloration secondary to tissue death, it is important to recognize that early NF may present without physical exam findings (as opposed to cellulitis). Clinical signs and symptoms, such as unexplained tachycardia, could suggest systemic toxicity and warrant further investigation. High clinical suspicion necessitates emergency department (ED) referral for labs, imaging, and/or possible emergent surgical debridement without delay. Early operative intervention is associated with improved survival outcomes, and surgical treatment delayed more than 6 hours from symptom onset is associated with increased mortality.¹

Case Presentation

A 43-year-old male presented to the ED with 10/10 right posterior knee pain for 3 days.

- **Past medical history:** He was acutely ill prior to the onset of knee pain with a 40°C (102°F) fever, myalgias, congestion, and cough. He sought care at an urgent care (UC) center. At the UC, he received negative test results for both influenza and streptococcal pharyngitis but was treated with oseltamivir due to high clinical suspicion of influenza.
- **History of present illness:** Now in the ED 4 days after the UC visit, the patient denied redness, swelling, edema, chest pain, shortness of breath, or local tenderness. He had been tolerating fluids and tak-

ing acetaminophen and ibuprofen as needed for the pain.

- **Past surgical history:** None.
- **Social history:** He denied drug and alcohol use.

Physical Exam

The patient's vitals in the ED included: blood pressure of 105/63 mmHg; heart rate of 114 beats per minute; temperature of 36.7°C (98.0°F); respiration of 18 breaths per minute; and oxygen saturation of 100% on room air.

Medical Decision Making

The patient's initial work-up considered deep vein thrombosis (DVT) due to his presenting symptom of unilateral leg pain. His labs were limited to a basic metabolic panel (BMP) as well as D-dimer, which was found to be elevated.

- **D-dimer:** 1140 ng/mL (normal: 0–599 ng/mL) (high)
- **Creatinine:** 1.4 mg/dL (normal: 0.40–1.20 mg/dL) (high)
- **Chloride:** 95 mmol/L (normal: 101–111 mmol/L) (low)
- **Sodium:** 132 mmol/L (normal: 130–142 mmol/L)
- **Potassium:** 3.6 mmol/L (normal: 3.8–5.0 mmol/L)
- **CO₂:** 23 mmol/L (normal: 21–31 mmol/L)
- **Blood urea nitrogen:** 15 mg/dL (normal: 7–18 mg/dL)
- **Calcium:** 9.1 mg/dL (normal: 8.4–10.2 mg/dL)

Since he was initially deemed clinically stable with no visible limb-threatening symptoms, he was considered low risk for DVT. He received 1 dose of oral apixaban for anticoagulation and was discharged with a referral for outpatient ultrasound (US) given the suspicion of DVT. Further assessment of his tachycardia, such as a repeat set of vitals, was not performed.

Differential Diagnosis

The differential diagnosis for this patient included DVT, NF, pulmonary embolism, acute limb ischemia, compartment syndrome, cellulitis, rhabdomyolysis, electrolyte abnormalities, and myositis. Many of these conditions may be differentiated with laboratory evaluation and physical examination. However, soft tissue infection and DVT can be difficult to differentiate, as they may present similarly with erythema, edema, warmth, and tenderness of the skin.² Cellulitis involves the lower extremity in 70%–80% of cases, consistent with this patient's symptoms.² Documentation from the initial visit focused primarily on exclusion of DVT and pulmonary embolism, with limited discussion of alternative diagnoses.

Final Diagnosis

The following morning, the patient returned to the ED via ambulance, complaining of worsening right lower extremity pain and swelling. He denied chest pain, shortness of breath, trauma, or injuries. A physical exam revealed worsening tachycardia, unilateral leg swelling, calf tenderness, and mottled skin discoloration of the medial malleolar region.

Additional workup was initiated during this ED visit, including a CT scan that revealed diffuse subcutaneous and intermuscular fascial edema. Due to the severity of his condition, he was transferred to a different hospital for intensive care and surgical intervention. Operative debridement and right hip disarticulation revealed findings suggestive of a necrotizing soft tissue infection. He was ultimately diagnosed with NF, leading to septic shock with multiorgan failure, which resulted in death the next day.

Indications For Referral to ED

A referral to the ED can facilitate direct admission to the hospital for medical treatment and prevent delayed diagnosis and management of NF. Indications for referral include the following:^{1,2,3,4}

- Pain out of proportion to physical exam
- Sudden onset or rapid progression of symptoms
- Leg coolness, cyanosis, or numbness
- Rapidly spreading erythema, bullae, ecchymosis
- Hypotension
- Tachycardia
- Shortness of breath
- Chest pain
- Altered mental status

Discussion

NF is a rapidly spreading infection commonly caused by group A *Streptococcus* or polymicrobial organisms that enter through breaks in the skin. Reported mortality and amputation rates for necrotizing soft tissue infections vary from 6%–33%, depending on time to treatment, comorbidities, and severity.¹ Advanced age, female sex, and sepsis at presentation are also associated with higher mortality rates.¹ NF can be challenging to diagnose due to its vague presentation, so early identification is critical to avoid catastrophic outcomes. Radiographic imaging and laboratory studies can be helpful with diagnosis, but no imaging should delay surgical exploration, as NF characteristically spreads rapidly within hours.^{1,5}

Imaging

Ultrasound (US) can be helpful in identifying subcuta-

“NF can be challenging to diagnose due to its vague presentation, so early identification is critical to avoid catastrophic outcomes.”

neous gas collection.⁶ NF appears on US as thickened, distorted fascia with hypoechoic fluid collection and swelling in the muscle and surrounding tissue.⁷ CT is the preferred imaging method to diagnose NF due to its higher spatial resolution and wider availability, making soft tissue gas more visible than US.⁶ However, 36% of cases will not show this characteristic finding and will not be apparent on CT.⁸ Though CT is highly useful, a negative CT should not postpone surgical referral.⁸

Magnetic resonance imaging (MRI) can also be helpful, as it is reported to have a 90% or greater sensitivity but a rather high false positive rate at 39%. However, due to the time commitment, MRI is not indicated in NF emergencies.⁵ The most accurate diagnosis is made via surgical exploration and early operative debridement of necrotic tissue. Intravenous broad-spectrum antibiotics also are necessary to control the infection spread and bacterial load.¹

Work-Up Analysis and Considerations

With the benefit of hindsight, it is important for clinicians to review this case and consider measures that can be taken to prevent poor outcomes in patients presenting with leg pain. This patient’s initial lab workup was limited to a D-dimer and BMP, which raises the question: Could additional laboratory evaluation have resulted in a better outcome? Common labs, such as a complete blood count, erythrocyte sedimentation rate, and C-reactive protein (CRP) tend to have poor sensitivity and specificity, as they can be elevated in multiple conditions, including DVT, cellulitis, and erysipelas.^{9,10,11} Even when distinguishing between 2 seemingly unrelated conditions, like DVT and cellulitis, D-dimer and Wells Scores can be elevated, so these measures should not be used to definitively establish a diagnosis.³

A physical exam may not always be immediately helpful in the diagnosis of NF. It can present vaguely,

“Depending on the time of presentation and disease progression, skin findings may be mild or nonexistent.”

as it did in this patient. Depending on the time of presentation and disease progression, skin findings may be mild or nonexistent. One study found that only 15% of patients with necrotizing fasciitis admitted to the ED were diagnosed at the time of admission.¹² Other symptoms, such as bullae (present in only 25% of cases) crepitus, or pain out of proportion to physical exam tend to be present later in the course of infection, but even these are not completely specific.¹³ When conducting a physical exam in a suspected NF case, note the patient’s reaction to palpation, ask them to rate their pain, and feel for a crackling sensation beneath the skin. A finger probe test may also be performed, where a clinician makes a small incision to see if bleeding occurs. Lack of bleeding, poor tissue quality, pus leakage, or any signs and symptoms consistent with NF should warrant immediate surgical referral.^{12,13}

The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score was created to help efficiently identify NF. This score uses CRP, white blood cell count, hemoglobin, sodium, creatinine, and glucose to calculate a score to distinguish NF from other similarly presenting conditions. A score greater than 6 raises suspicion for NF.⁴ Although useful and easy to use, a meta-analysis found that a LRINEC score ≥ 6 has a sensitivity of 68.2% and specificity of 84.8%.¹³ Because of LRINEC’s poor sensitivity, it is not recommended to definitively rule-out necrotizing soft tissue infection.¹³

In this patient’s case, it may have been useful to use point-of-care imaging. Since the patient ultimately did not have DVT, US may have guided the clinician’s clinical decision making to consider other potential etiologies. Bedside US performed by an attending physician with training has shown in several studies to have adequate sensitivity and specificity in the diagnosis of DVT.^{14,15,16,17,18} US can efficiently identify DVT, gas collection, perifascial edema, and cobblestoning (due to

fluid separating subcutaneous fat consistent with infections of soft tissue).⁷

Disposition

At his first ED visit, the patient received medical management and orders for imaging for presumed DVT. Prior to his scheduled imaging appointment, he returned to the ED via ambulance for evaluation of worsening symptoms. The patient died within 24 hours due to NF, refractory septic shock, and multiorgan failure.

Pearls For Urgent Care Management

- The earliest and most important finding in early NF is pain out of proportion to physical exam. Pain typically presents before skin findings (eg, erythema, ecchymosis, bullae, skin crepitus, or skin anesthesia) and should raise concern for NF.
- NF is a clinical diagnosis. If a patient describes rapidly progressing pain over the course of a few hours, consider a diagnosis of NF.
- X-ray and US can appear normal initially, and lack of gas on imaging does not rule out NF.
- If concerned for NF, do not delay emergent ED transfer.
- Repeat vital signs in patients presenting with vital sign abnormalities. Isolated tachycardia can be indicative of many acute pathologies.

Red Flags and Legal Pitfalls

- Do not delay ED referrals for possible NF in UC for any reason, as this can delay life-saving surgical and medical intervention.
- Discharging patients with unexplained vital sign abnormalities may lead to delayed diagnosis of time-sensitive, life-threatening conditions.
- Analyze the benefits, risks, and differential diagnoses when considering presumed DVT for outpatient management.

Ethics Statement

The patient’s next of kin was unable to be contacted. Demographics and some details of the case were changed to protect patient anonymity and confidentiality.

Takeaway Points

- NF is a life-threatening condition which creates a diagnostic challenge. Early recognition and management is critical to prevent morbidity and mortality.
- Early NF may present without obvious skin findings; unexplained severe pain and isolated tachycardia should prompt consideration of possible infection.

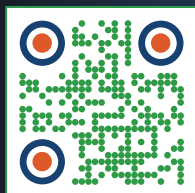
- Negative imaging in the urgent care does not exclude NF, and concern for the diagnosis should prompt emergent ED transfer for surgical evaluation. ■

Manuscript submitted February 5, 2026; accepted May 13, 2026

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