

Case Report
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Utilization of Lrinec Score for Early Diagnosis of a Necrotizing Soft Tissue Infection by *Serratia Marcescens* Complicated with Deep Vein Thrombosis

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ABSTRACT

Necrotizing fasciitis (NF) has a rapid clinical course and is associated with high mortality. Moreover, it involves a high index of suspicion and early aggressive intervention to reduce the risk of mortality. The overlap in clinical presentation in similar pathologies like abscesses, cellulitis, and deep vein thrombosis, can mask underlying NF, making the diagnosis even more challenging. This case presents multiple comorbidities that expedited the development of NF, while demonstrating a pragmatic approach to treating NF while balancing anticoagulation and emergent surgical intervention. The utilization of clinical judgement and a risk stratification score can help identify early cases of NF allowing for aggressive intervention.

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Introduction

Necrotizing soft tissue infections (NSTIs) include a vast array of necrotizing forms that affect the deeper layers of tissues including fasciitis and myositis [1]. Though rare, with approximately 500 to 1500 estimated cases per year, many providers find the diagnosis difficult due to unaffected appearance of overlying tissue on initial presentation [2]. The present case showcases complexities of a Type II Monomicrobial NSTI, *Serratia Marcescens* (*Serratia M*), its ability to create a prothrombotic state and the benefit of utilizing the Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score, for early identification of NSTIs [3].

Case Presentation

A 66-year-old African American male with medical history significant for essential hypertension, hyperlipidemia, non-insulin-dependent diabetes mellitus (DM) complicated by a diabetic foot ulcer presented with complaint of left lower extremity edema. The patient reported an insidious onset of swelling that started five days prior to arrival with no precipitating or consequential factors. He stated that ambulation had become difficult as he began to experience mild pain in his left calf after walking long distances. He described this pain as a pressure like sensation that is relieved with rest. The patient reported a non-healing DM left ankle ulcer that has been dormant for the past year, however, it was now producing a “watery” like discharge. He denied any trauma to his leg, tingling, numbness, fever, chills, or any other acute distress.

Patient was hemodynamically stable and afebrile. On physical examination, he was noted to have bilateral lower extremity venous stasis, 3+ pitting edema extending beyond the left thigh,

erythema below the left knee with blisters on the medial aspects of the left leg. Additionally, there was a quarter size ulcer surrounded by discolored tissue on the left medial aspect of the ankle draining serous fluid without evidence of bleeding.

Laboratory studies were significant for elevated D-Dimer (12.6 ug/mL), CRP (1.9mg/dL), and ESR (29 mm/hr). A bedside Venous doppler confirmed an extensive left thrombus involving the common femoral vein, superficial femoral vein, popliteal vein and left profunda femoral vein. Computed tomography (CT) of the lower extremity was consistent for cellulitis of the left leg without abscess or subcutaneous air. During hospitalization, the treating diagnosis included cellulitis and deep vein thrombosis that was treated with IV Clindamycin and therapeutic anticoagulation. With clinical improvement, the patient was discharged home with a total of 10 days of antibiotics and wound care.

Eight days after discharge, the patient was re-evaluated at the wound care clinic. The cellulitis had progressed and measured at 9cm x 12cm x 1cm, nearly three times the original size. The left lower extremity was noted to be beefy red with small amounts of serosanguineous drainage. Laboratory findings indicated leukocytosis (14.6) and elevated ESR (111mm/hr) and CRP (17.5mg/dL). He was immediately sent for surgical evaluation, an incision and drainage with wound debridement was performed. During debridement multiple cavitory abscesses of the left lower extremities were appreciated. Pathology and cultures were consistent with necrotizing soft tissue infection with *Serratia M.*, a gram-negative bacterium. Per Infectious disease recommendations, he was started on a prolonged course of IV Pip-Tazo and empiric

coverage with IV Vancomycin. Ultimately, with early recognition, aggressive surgical intervention, intense wound care, and physical therapy the patient's lower extremity was preserved.

Discussion

Necrotizing soft tissue infections have a rapid clinical course and are usually associated with a high mortality, ranging between 14-39%. The disease has three variants, Type I, II and III. Type I contains polymicrobial infection, Type II is monomicrobial, and Type III is associated with gas gangrene. The most common monomicrobial infections include group A streptococcus, particularly methicillin-resistant staphylococcus aureus (MRSA). Early signs of NSTI are dubious as they often mimic simple soft tissue infections [4]. The infection can evolve in a course of days, changing the color of the skin as it begins to decompose from blanching red to gray patches.

In this case, the patient presented with a Type II NSTI. Moreover, the microbe found in this case, *Serratia M.*, presented to be extremely rare and atypical with only 17 reported cases. *Serratia M.* is a motile gram negative, opportunistic microbe usually found in the soil but is also found as a colonizer of the respiratory and urinary tracts. It is dubbed as an opportunistic infection affecting those who are immunocompromised [5]. *Serratia M.*, in normal circumstances has low virulence factors thereby making it weak to those who have competent immune defense mechanisms. In a compromised state, the microbe will thrive in higher concentrations activating cascades of hyperreactive cellular responses of monocytes, macrophages, platelets, and endothelial cells [6].

Thereby, creating a hypercoagulable state through a pro-inflammatory response via coagulation factors like monocyte-derived tissue factor (mTF). Furthermore, traditional inflammatory mediators seen in sepsis IL-1, IL-6, TNF α , and IFN γ upregulate factors VII and VIIa and reduce anti-coagulation proteins and thus precipitating a pro-thrombotic event [7]. In this case, though the patient was a compliant diabetic, with a well-controlled hemoglobin A1C (6.4) the long term effects of this diabetes prevented him from propagating an immune defense against NSTI and even increased his susceptibility to a thrombotic event.

The complexity of this case does not go unnoticed. During the initial assessment, the patient's presentation was most concerning for a DVT. The patient's symptomatic presentation such as pain with ambulation, swelling, and tenderness were all suggestive of a thrombus. Though tissue infection was in the differential, all initial findings dissuaded the suggestion of NSTI. Moreover, the initial CT studies did not indicate any air or abscess and the only abnormal imaging was noted by the doppler ultrasound for a DVT. It was only after his second encounter at the hospital was the diagnosis of NSTI successfully made by the surgical team. After which, the prioritization of treatment became a conundrum, whether anticoagulation should be held so that aggressive debridement can be done- at the risk of propagating a pulmonary embolism versus bleeding perioperatively or precipitating bacteremia.

During the initial assessment, whether the patient had NSTI was unclear hence the LRINEC score was calculated. The patient's initial LRINEC score was 2 out of 12, at his second encounter his score had increased to 7 points, now suggestive of NSTI [8]. The final LRINEC score indicated a positive predictive value of 92% with a negative predictive value of 96% for NSTI. A study by Wong et. al. performed a prospective study utilizing the LRINEC score resulting with positive predictive value of 92% and negative predictive value 96% suggesting being a beneficial tool [9].

Other case studies have shown a sensitivity of 77% with low specificity indicating a good tool to rule out NF. On the contrary, retrospective studies suggest the score may be inaccurate as 63.8% of patients with confirmed diagnosis of NF were categorized as low risk for NF [10,11]. It is noteworthy to highlight the rapid progression of disease for this patient. In this case, the LRINEC score was beneficial in identifying NSTI early, prompting a surgical consult. Early diagnosis of NSTI is crucial, it is estimated that between 85 to 100% of NSTI are initially missed and often confused for myositis, DVT, cellulitis, or deep tissue abscess. A high index of suspicion is imperative in lieu of absent cutaneous findings early in the course of the disease process.

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