

# A Rare Disease Requiring Quick Decision: Necrotizing Soft Tissue Infection

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**Abstract:** *Necrotizing soft tissue infection (NSTI) is a rare infection of the deeper layers of skin and subcutaneous tissues. NSTIs may be presented with atypical or nonspecific clinical features and lead to increased mortality if the diagnosis and proper treatment is delayed. This report describes a case of NSTI with nonspecific clinical findings and highlights the importance quick decision in this disease.*

**Keywords:** Necrotizing soft tissue infection, diagnosis, treatment, quick decision, mortality

## 1. Introduction

Necrotizing soft tissue infection (NSTI) is a rare condition well-known with its high-speed progression involving necrosis of subcutaneous tissues, muscles and skin. It is known that, this rare condition carries high mortality rate and requires prompt diagnosis and urgent treatment with surgical debridement and antibiotics. However, the early diagnosis is the major challenge in NSTI, due to the paucity of cutaneous findings in the early course of the disease. Patients usually present with nonspecific symptoms such as pain, fever, tenderness, and warm skin which may lead to delays in diagnosis and increase mortality. We hereby describe a rare case of NSTI admitted to the emergency department with nonspecific features and could be diagnosed promptly with the experience and awareness of the physicians.

## 2. Case Report

A 48-year-old male patient admitted to the emergency department of our hospital with pain in his right thigh after a fall from a ladder. He had a history of flu-like symptoms (generalized myalgia and fever) after this event for 2 days. These symptoms were followed by increase of the pain in the right thigh region affecting him especially for last 3 days. He was a laborer and had no past history of a chronic disease. He was an active smoker with a smoking history of 40 packs/year. He had never consumed illicit drugs, had no allergies, and had no history of an alcohol addiction.

On examination, blood pressure was 120/80 mmHg and electrocardiography was showing sinus tachycardia with a rate of about 130 beats/minute. He had a fever (38.6°C) and was complaining of the trembling especially in the last 2 days. Oscultation of the chest revealed normal lung sounds in the both lungs and chest radiograph of the patient was including normal findings. He had tenderness in lateral side of his hip and in the posterior femoral region which was accompanied by increased local heat. Although range of motion of the thigh was reduced there were no cutaneous changes in this region. Examination of the blood samples revealed normal count of hemogram (WBC: 8200/mm<sup>3</sup>, Hb:

15.4 g/dl). Results of the blood chemistry were also within normal limits. Serum level of C-reactive protein (CRP) was 354 mg/dl with elevated levels of creatine kinase (1007 U/l) and lactate (4.9 U/l). Radiographs of the patient revealed no dislocation and fracture in the skeletal structures. However there was a subcutaneous emphysema and inflammatory stranding with low attenuation in the right thigh region which was especially suggesting a necrotic soft tissue infection (Figure 1a, b, c).

After a consultation with the surgery department, patient underwent debridement of the lateral side of the right thigh with the prediagnosis of subcutaneous abscess formation. The intraoperative findings were typical of NSTI, including loss of tissue-plane resistance and necrosis of the subcutaneous fat. The wound was washed thoroughly. Immediate histopathological study of the debridement material showed the presence of Gram-negative bacilli which was eventually identified as *E. coli*. The case was discussed with microbiologist and intravenous (IV) clindamycin, vancomycin and piperacillin-tazobactam were administered for 3 weeks. IV hydration was maintained with close observation of renal functions which remained stable. The patient was discharged home after 3 weeks of in-hospital stay in the general surgery department. Last contact with him was a polyclinic visit for control one year after discharge and he was free of all previous symptoms.

## 3. Discussion

NSTI is a life-threatening condition which has been recognized since 18th century with various names such as phagedena gangrenosum, hospital gangrene, Melaney's gangrene, and Fournier's gangrene. Then, from 1952 till early 2000s, the disease was mostly named as "necrotizing fasciitis (NF)" compatible with the description of Wilson (1). However, in the recent years, the term "necrotizing soft tissue infection (NSTI)" has been suggested to encompass all of the necrotizing tissue infections and advocate an approach to all of them that uses the same principles for diagnostic and treatment strategies (2).

NSTI is a relatively rare disease with the incidence of 0.4 to 0.53 cases per 100,000 (3, 4). Although patients with

systemic illnesses, immunosuppressive medications, trauma, recent surgery, diabetes mellitus, vascular insufficiency, renal and hepatic failure, cancer, organ transplants present an increased risk for development of this disease(5), NSTI may also affect previously healthy individuals as seen in this case. This condition can involve any part of the body but primarily involves extremities, abdomen or perineum(6). Consistent with the literature, site of the infection was the right lower extremity in this case.

The most common early signs of NSTI are nonspecific features such as pain, fever, tenderness, and local skin warmth, and absence of cutaneous findings on admission makes the early diagnosis difficult (7). Pain out of proportion to the apparent severity of the lesion, patches of skin necrosis, tissue crepitus, fluctuance and systemic evidence of sepsis such as hyperthermia, tachycardia and hypotension should alert the physician to the possible diagnosis of NSTI (7). The patient in this case was also presented without cutaneous findings and he had nonspecific symptoms which could lead to delay in the diagnosis. However, our previous experience, disproportionate pain compared to the clinical findings, and radiological features oriented us for further evaluation.

Most commonly NSTI is classified on the basis of microbiology and there are two main groups of NSTI, as type-I (polymicrobial) and type-II (monomicrobial). Type-I, represents approximately 80-90% of all NSTI cases, includes polymicrobial infection involving Gram-positive cocci (non-group A streptococci, staphylococcal species), enterococci and gram-negative enterobacteriaceae (Escherichia coli, Acinetobacter species, Pseudomonas species and Klebsiella species), and/or anaerobs. Type-II infections are usually caused by group A streptococci (Streptococcus pyogenes) either alone or in association with S. aureus (8). These classification systems are not clinically significant as they do not change the management of the patient. Although only E.coli was identified from the surgical material of this patient, he was referred to as type-I NSTI and antibiotic regimen was chosen carefully to cover all possible agents of this type.

Diagnosis of NSTI is based on combination of laboratory, microbiological and radiological investigations. Routine laboratory including white blood cell count and CRP level, plain radiographs, computerized tomography (CT) scan, and magnetic resonance imaging (MRI) are helpful tools for the diagnosis. CT scanning is more accurate in detecting gas tracking along fascial planes than plain radiographs(9). However, CT scan sometimes does not adequately differentiate severe cellulitis and NSTI, and cases of NSTI with negative CT findings have been reported (10). MRI has the highest sensitivity (93-100%) for diagnosing NSTI. NSTI exhibits high signal intensity (hyperintense signal) on T2-weighted MRI corresponding to fluids associated with the disease. By using MRI, Rahmouni et al. were able to separate necrotizing soft-tissue infections which need immediate surgical intervention from non-necrotizing cellulitis, which can be treated medically (11). Plain radiograph of the patient in this case was suggesting a presence of gas in the subcutaneous tissue, so surgical intervention was performed for the prompt

diagnosis instead of considering further radiological investigation.

Early diagnosis, broad spectrum antibiotics and surgical debridement are the keys to successful treatment in NSTI, which explains the requirement for urgent surgical consultation (12). Repetitive surgical debridement should be performed frequently (even daily) until the acute tissue destruction has been controlled (13). Due to frequent rapid progression of the disease, NSTI may result in bacteraemia and subsequent sepsis resulting in multiple organ failure, if could not be treated properly (14). Despite the efforts, the mortality of NSTI has been reported in recent studies to be approximately 20%, but it is even higher in some reports (6, 15). In this case, debridement was performed immediately after detection of signs of NSTI in the emergency department with the consultation of surgery.

In conclusion, clinicians should always keep in mind that NSTIs may be presented with nonspecific clinical features. If suspected, quick decision-making is the important step in reducing death and mortality.

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images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

#### Author Contributions:

EO: Concept and design of the study, acquisition of data, analysis and interpretation of data, revising the article critically for important intellectual content, final approval of the version to be published.

MU: Concept and design of the study, acquisition of data, analysis and interpretation of data, revising the article critically for important intellectual content, final approval of the version to be published

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**Figure 1:** Radiographs of the patient. (a) Lateral graph of the femur (b) Anteroposterior graph of the femur (c) Anteroposterior graph of the pelvis