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Case report

The Stealthy Killer: Rapidly Fatal Type II Necrotizing Fasciitis Due to *Streptococcus pyogenes*

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ABSTRACT

Necrotizing fasciitis, a rare yet lethal infection, may cause serious complications such as sepsis, progressing to septic shock, and death. Herein, we have reported a fatal case of necrotizing fasciitis complicated by septicaemia that rapidly progressed to septic shock and eventually death, in an elderly male patient at a tertiary care hospital. Microbiological confirmation was done through isolation of *Streptococcus pyogenes*. Despite timely interventions post-admission, the patient could not be saved due to his late presentation at the hospital. An increased threshold of clinical suspicion and comprehensive examination is crucial for diagnosing this condition. Early presentation and prompt surgical intervention can be life-saving.

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INTRODUCTION

Necrotizing fasciitis (NF) is a rare yet severe and devastating infection of the soft tissue, marked by rapidly advancing tissue necrosis. It affects the superficial and/or deep fascia, sometimes involving the muscles, and most commonly impacts the extremities, perineum, or trunk.[1] The source of the infection can originate from the skin, where organisms penetrate the tissue through trauma (which can sometimes be minor), or from the bowel flora, with organisms released during abdominal surgery or from an undetected enteric source.[1] Microbiologically, NF are classified into two main types: Type I, which is polymicrobial and Type II, which is monomicrobial. The most common organism associated with NF is Streptococcus pyogenes (60%) which can lead to streptococcal toxic shock syndrome (STSS), marked by shock and multiple organ failure.[2] The disease can rapidly result in widespread tissue necrosis, leading to sepsis, septic shock, systemic toxicity, and potentially death.Thus, timely diagnosis and early surgical exploration, along with adjunctive antimicrobial therapy, are crucial for managing this condition.[3] This report presents an intriguing case of NF with septicaemia that rapidly advanced to septic shock in an elderly male patient at a tertiary care hospital.

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CASE REPORT:

An 84-year-old male presentedto the emergency department with a skin lesion on thelateral and posterior aspect of his left leg, accompanied by foul-smelling discharge and red discoloration for the past eight days, which was gradually progressing in nature (Figure 1).



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There is no history of trauma or fall and remarkably no known chronic conditionswere stated. On admission, hisblood pressure (BP) was 90/60 mm Hg, heart rate (HR) was92 beats/ minute, respiratory rate (RR) was 20 breaths/minute, oxygen saturation (SpO2) was of 98% in room air and random capillary blood glucose (CBG) was 88 mg/dl.On examination,bilateral pedal pitting edema was demonstrated. His chest was clear, heart sounds were regular with no murmurs and abdomen was soft, with no guarding or rigidity. The Glasgow coma scale (GCS) was 13 (E4V4M5). Arterial blood gas (ABG) analysis indicated compensated metabolic acidosis. A provisional diagnosis of NF with septicaemia was made and he was started empirically on Injection meropenem, vancomycin and single dose of amikacin. Local examination revealed the presence of skin breach, ecchymosis on the lateral and posterior aspects of the left thigh, accompanied by serous discharge and vesicle formation on the posterior aspect, which was tender on palpation.

Blood analytes were reviewed, primarily indicating low haemoglobin count, high total leucocyte count (TLC) and deranged renal function test(elevated urea and creatinine) (Table 1).

Table 1: Significant laboratory parameters

Parameters	Values	Reference Range
Haemoglobin (g/dl)	7	13.0-17.0
TLC (10^3/µL)	20.66	4.0-10.0
DC-Neutrophils (%)	94	40-80
DC-Lymphocytes (%)	03	25.0-40.0
Platelet count (10^3/µL)	290	150.0-450.0
CRP (mg/dl)	16.2	<0.8
PT-INR	1.6	0.98-1.2
Urea (mg/dl)	136	19.0-43.0
Creatinine (mg/dl)	2.4	0.66 – 1.25

The international normalized ratio (INR) was elevated, for which two units of fresh frozen plasma were transfused.

The patient was stabilized, and thereafter, he underwent surgical debridement of necrotic tissue within four hours of presentation. Post procedure, he was transferred to the intensive care unit on intubation and mechanical ventilation. He was extubated eight hours after the surgical procedure, but his condition deteriorated further, necessitating re-intubation. A few minutes after intubation, he developed atrial fibrillation and subsequently went into cardiac arrest. The patient expired thereafter, with the cause of death attributed to severe metabolic acidosis due to acute kidney injury, septic shock from septicaemia, in a case of NF, compounded by underlying coagulopathy and anaemia.

Diagnosis:

Tissue samples were sent for Gram stain, culture, and antimicrobial susceptibility testing. Gram staining revealed moderate polymorpho nuclear cells with a few Gram-positive cocci arranged in pairs and short chains (Figure 2). Notably, beta-hemolytic colonies were observed on blood agar (Figure 3), which were catalase negative. Eventually, Strepto coccus pyogenes was identified and tested for antimicrobial susceptibility using the MicroScan WalkAway® plus system (Beckman Coulter, USA). Majority of the antimicrobials were sensitive as per the Clinical and Laboratory Standards Institute (CLSI) 2025, M100 guidelines except for erythromycin and chloramphenicol.

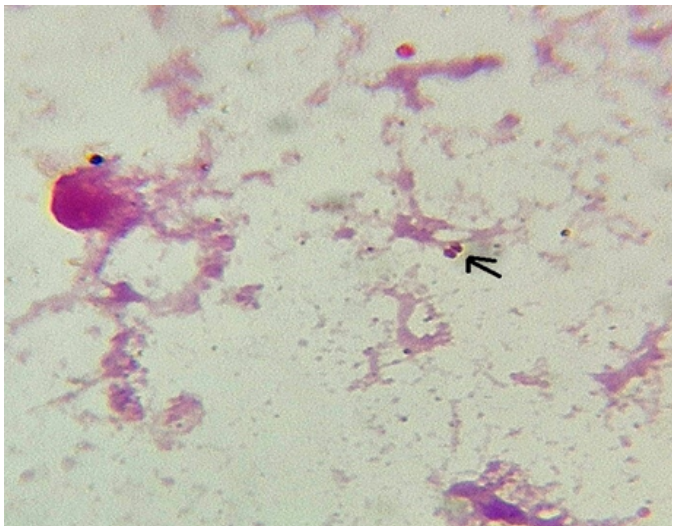


Figure 2: Gram stain showing Gram-positive cocci in pairs

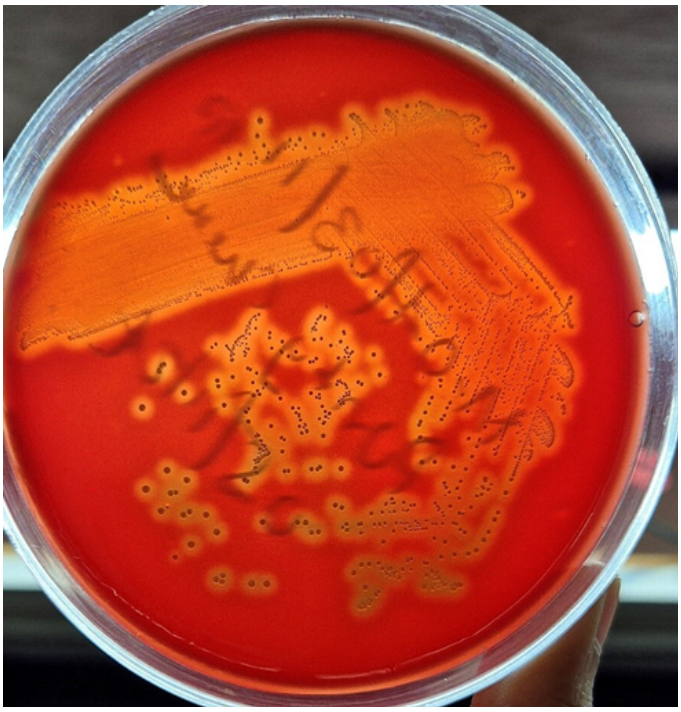


Figure 3: Beta-hemolytic colonies of Streptococcus *pyogenes* isolate

DISCUSSION:

Diagnosis of NF poses a challenge for clinicians, as it is a rare disease that often leads to delayed or missed identification and increased mortality rates.Due to the challenges in diagnosis and indistinctive symptoms, especially in the early stages, its incidence is thought to be underestimated. [4] The disease has a male preponderance (ten times higher risk in men than in women).[5]Some known risk factors of NF that also worsen the prognosis include compromised skin integrity, extremes of age, type 2 diabetes mellitus (uncontrolled), obesity, alcoholism, atherosclerosis, immunocompromised conditions (both congenital and acquired) and the use of non-steroidal anti-inflammatory drugs ((NSAIDs).[6] In this case, both advanced age and male gender were identified as risk factors. Microbiologically, the patient was classified as having type II NF, with the causative organism identified as Strepto coccus pyogenes.

The diagnostic challenge of NF lies in its deceptive early presentation. The pathognomonic sign—pain out of proportion to physical findings-is frequently overlooked or attributed to less severe conditions like cellulitis.

In this patient, the transition from subtle erythema to overt necrosis likely occurred rapidly, but the absence of early 'hard signs' such as crepitus or bullae during the initial days may have contributed to the delay in seeking tertiary care. By the time of admission, the presence of skin breach and vesicle formation indicated advanced tissue death and systemic seeding. [7] In this case, despite an early intervention shortly after admission, we were unable to save the patient due to his late presentation at the hospital, where he was already at the state of sepsis.

Surgical debridementperformed as early as possible is life-saving and regarded asthe gold standard in managing NF. It lessens the extent of necrotic lesions and decreases the degree of tissue loss and amputation, ultimately resulting in lower mortality rates.[7] Confirmation of the causative organism relies on cultures obtained from the affected tissues. Proper sample collection procedures are crucial, as targeted antimicrobialsare then given based on the antibiogram results.The Laboratory Risk Indicator for NF (LRINEC) score was developed to screen for potential NF cases.[8] A LRINEC score above eight indicates a high risk. In the case described herein, the score, after retrospective evaluation, was eleven. It should always correlate with the clinical presentation and physical examination findings. [9]

This case underscores the critical importance of maintaining a high clinical suspicion and conducting a comprehensive clinical examination in patients presenting with such clinical picture or with sepsis of unknown origin. Additionally, prompt microbiological confirmation of the causative organism and its susceptibility pattern is crucial for the management of NF. Furthermore, educating the general population on the appropriate handling and care of traumatic wounds is crucial to minimize their occurrence.

Declaration of patient consent:

The authors certify that they have obtained all necessary patient consent forms. In the form, the patients have given their consent for their clinical information to be reported in the journal. The patients understand that due efforts will be made to conceal their identity.

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Conflicts of interest

There are no conflicts of interest.

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