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Case Report

Necrotizing fasciitis associated with *Enterococcus avium* in a Type 2 Diabetes Mellitus patient: A case report

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Abstract

Necrotizing fasciitis (NF) is a rapidly progressive and life-threatening infection of the soft tissue. Diabetic patients are especially at risk due to impaired immunity and poor wound healing. We report a case of NF in a 60-year-old Indonesian man with poorly controlled type 2 diabetes. He presented with a rapidly worsening wound on his right foot following a minor abrasion, along with signs of sepsis and early organ dysfunction. His LRINEC score was 10. He underwent urgent surgical debridement and below-knee amputation. Despite initial improvement, he deteriorated and died from septic shock on day five. Wound culture revealed *Enterococcus avium*, a rare pathogen that is resistant to several antibiotics but sensitive to vancomycin and linezolid. This case highlights the severe progression of NF in diabetic patients and the need for early recognition and aggressive management. The presence of *E. avium* underscores the potential role of uncommon pathogens in serious infections among immunocompromised individuals. Delayed referral and lack of timely antibiotic adjustment may have contributed to the fatal outcome. Prompt diagnosis, early surgery, and appropriate antibiotics are crucial in managing NF. Clinicians should be vigilant in monitoring diabetic patients and consider rare pathogens, such as *E. avium*, in cases of severe infections.

Keywords: diabetes mellitus, necrotizing fasciitis, surgery, *enterococcus avium*, case report

Introduction

Necrotizing fasciitis (NF) is a rare, fulminant acute bacterial infection characterized by the rapid and progressive destruction of subcutaneous fat and fascia. It requires aggressive surgical intervention and can lead to extensive tissue necrosis, sepsis, severe systemic toxicity, multiorgan failure, and even death [1–3]. Literally, "necrotizing fasciitis" refers to a "fascial infection accompanied by tissue decay", often attributed as "flesh-eating bacteria", though no single specific pathogen is exclusively responsible. NF is considered one of the most challenging medical emergencies due to its lethality and the difficulty of early diagnosis [1, 4].

Currently, the incidence of NF ranges from 4 to 15.5 cases per 100,000 population annually [5], with approximately 500–1,000 new cases reported each year in the United States [6]. The mortality rate is relatively high, reaching 21.5% [4]. Reported risk factors associated with poorer prognosis include diabetes mellitus (DM), immunosuppression, chronic kidney disease, and liver cirrhosis [7]. *Enterococcus avium* is a Gram-positive bacterium from the *Enterococcus* genus, commonly found in poultry. Although its role in human infection is rare, accounting for approximately 1% of cases, its pathogenicity remains poorly understood [8]. Previous reports by Yuan *et al.* (2018), Li *et al.* (2022), and Khan *et al.* (2023) have described NF cases associated with

E. *avium* [9–11]. Additionally, Shanmugakrishnan *et al.* (2015) reported a rare case of E. *avium* infection presenting as gangrene in a diabetic foot [12]. In this study, we aim to report and comprehensively discuss a case of necrotizing fasciitis caused by E. *avium* in a patient with type 2 diabetes mellitus (T2DM).

Case presentation

A 60-year-old male from Surabaya, Indonesia, presented with necrotizing fasciitis of the right lower extremity. He was referred from a private hospital emergency department with a one-week history of a small abrasion on the right plantar foot, which evolved into a tense blister over the subsequent five days. Two days prior to admission, the lesion rapidly progressed, becoming larger, deeper, and spreading to the lower leg. It was associated with purulent and turbid discharge, swelling, areas of blackened tissue, and severe pain. Systemic symptoms included fever, nausea, and decreased appetite. The patient denied respiratory, gastrointestinal, or urinary complaints. He had self-treated the wound at home with normal saline solution and a gauze dressing. A gradual decline in consciousness was noted one day prior to admission.

The patient had an eight-year history of type 2 diabetes mellitus, with poor treatment adherence for the past six years. There was no history of hypertension, cardiovascular disease, liver or kidney disease, stroke, or prior similar wounds. He reported blurred vision for the past year. The patient was previously employed and independent in performing moderate to heavy daily activities, including exercise, walking long distances, and lifting objects. He had a daily habit of walking barefoot outdoors, which he believed to be therapeutic.

Clinical findings

Physical examination

Upon admission, the patient was somnolent (GCS E3V4M5) with stable vital signs: BP 120/70 mmHg, HR 88 bpm, RR 22/min, T 38.5°C, and SpO_2 99% on room air. Local examination revealed a tunnel-like ulcer with necrosis, edema, pus, and fifth toe mutilation on the right foot, with crepitus. Distal pulses in the right foot were diminished, but femoral and popliteal pulses were preserved bilaterally (Figure 1).

Laboratory and imaging

Initial laboratory findings revealed leukocytosis (WBC 62,880/µL), neutrophilia (95.5%), thrombocytosis (PLT 715,000/µL), anemia (Hb 10.0 g/dL), hypoalbuminemia (2.34 g/dL), elevated CRP (26.8 mg/dL), elevated serum creatinine (1.7 mg/dL), and hyperbilirubinemia (total 4.0 mg/dL, direct 3.2 mg/dL). Arterial blood gas analysis showed pH 7.44, pCO_2 30 mmHg, HCO_3 20.4 mmol/L, and PaO_2/FiO_2 ratio of 242 mmHg. Urinalysis indicated leukocyturia, hematuria, bilirubinuria, and proteinuria. The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score was 10, indicating high risk, and the Sequential Organ Failure Assessment (SOFA) score was 6.

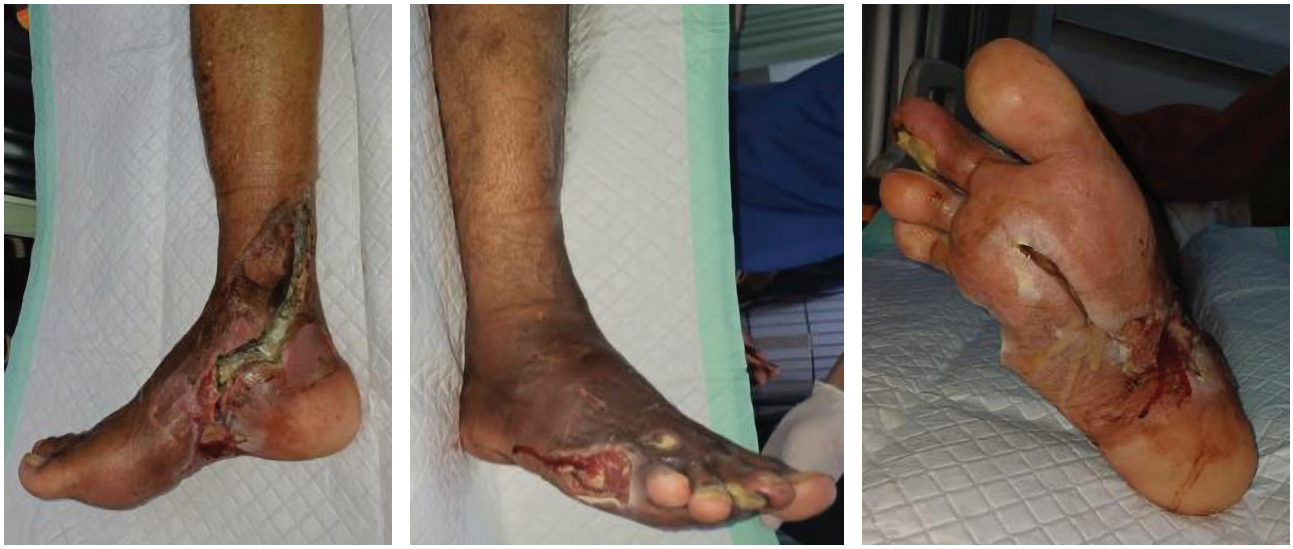

Figure 1: The right foot to the right lower leg at the time of presentation to the emergency department.

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Chest X-ray showed a right paracardiac infiltrate without cardiomegaly. Foot radiographs revealed distal fifth toe amputation, destruction of metatarsal bases of digits 2–4, and soft tissue swelling suggestive of necrotizing soft tissue infection (Figure 2A and B).

Management and clinical course

The patient was diagnosed with NF of the right foot and lower leg with sepsis and early multiorgan dysfunction. Initial management included intravenous ceftriaxone and metronidazole, fluid resuscitation, insulin therapy, albumin infusion, and surgical consultation. Emergent surgical debridement and above-knee amputation were performed on the second day of admission. Postoperatively, the patient showed initial clinical improvement, with a GCS improving to E4V5M6, resolution of fever, a decreased WBC count (54,380/μL), and stabilization of vital signs. However, hypoalbuminemia worsened, and serum sodium declined. Nutritional support, transfusions, and insulin therapy were continued. On day four, the patient developed new-onset fever and increased wound pain (VAS 7). Laboratory tests showed a gradual improvement in inflammatory markers and bilirubin levels, although albumin and sodium levels remained suboptimal. By day five, he deteriorated acutely with hypotension (BP 85/60 mmHg), high fever (39.1°C), altered mental status (GCS E2V2M4), and cold extremities. Despite fluid resuscitation and vasopressor support (norepinephrine 50 ng/kg/min), the patient progressed to septic shock and died within hours. Wound swab cultures revealed *Enterococcus avium*, resistant to clindamycin, gentamicin, levofloxacin, and penicillin, but sensitive to linezolid, tetracycline, cotrimoxazole, vancomycin, and erythromycin. Blood and urine cultures were negative. Unfortunately, antibiotic therapy could not be adjusted based on sensitivity results before the patient's demise, although initial postoperative improvement had been noted. Details of the disease progression and treatment timeline are available in the supplementary file (Table S1).

Discussion

Necrotizing fasciitis is a rapidly progressive and life-threatening soft tissue infection that constitutes a surgical emergency. The hallmark pathophysiology of NF involves rapid bacterial spread along the deep fascia due to its relatively poor vascularity compared to muscle tissue. This condition leads to widespread inflammation, thrombosis, ischemia, and ultimately necrosis of fascia and subcutaneous tissues. The fulminant nature of NF results from bacterial invasion and the subsequent release of exotoxins, which trigger sys-

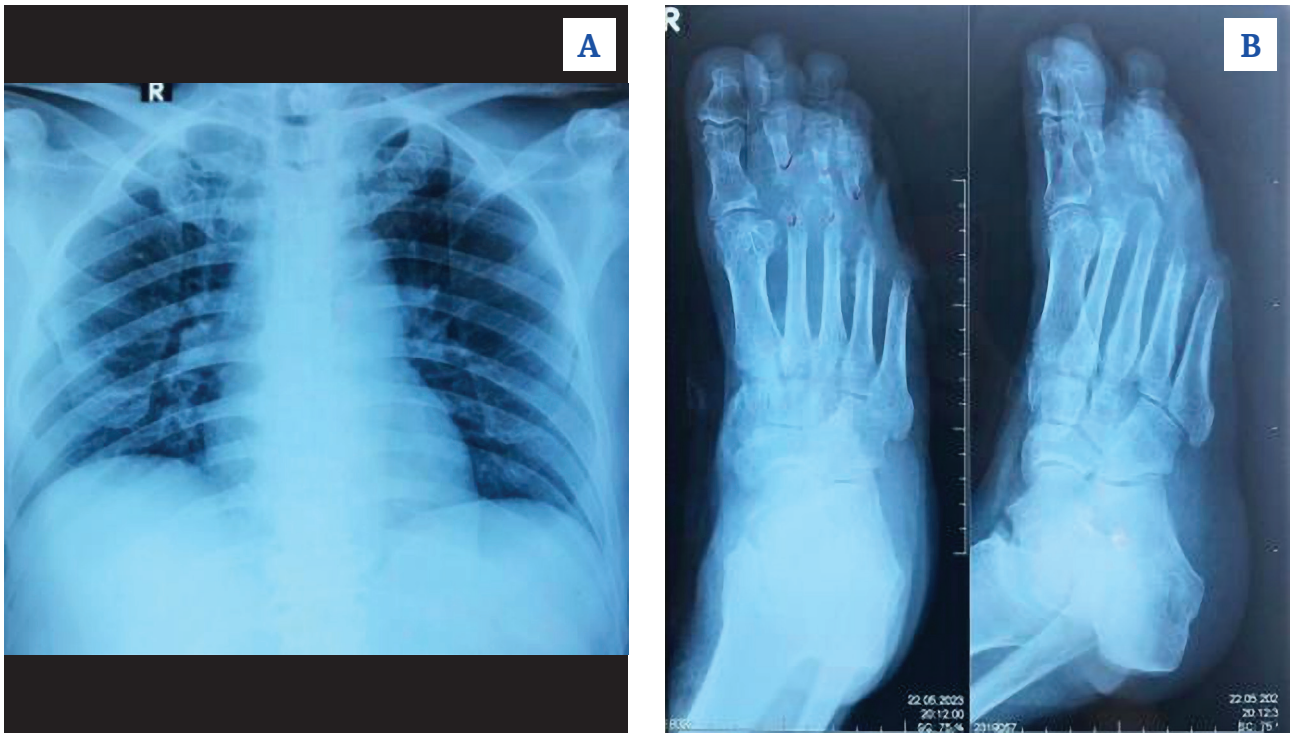

Figure 2: A – Chest radiograph; B – Anteroposterior and oblique views of the right foot.

temic inflammatory responses and culminate in sepsis and multiorgan dysfunction [13]. Clinically, NF often presents with high-intensity pain—frequently out of proportion to visible skin changes—swelling, and erythema. In the early stages, the clinical presentation may mimic cellulitis or abscess, making early diagnosis challenging. Characteristic features include rapidly spreading erythema, edema, skin bullae, tissue crepitus, and systemic signs such as fever and altered mental status. In diabetic patients, typical pain symptoms may be blunted due to peripheral neuropathy, further complicating diagnosis [14]. Our patient exhibited classic late-stage NF symptoms, including extensive necrosis, foul-smelling discharge, bullae, and septic deterioration. However, the diagnosis was delayed partly due to his diabetes and history of barefoot walking, which likely served as the portal of entry.

The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score can help support clinical suspicion. A score of 8 or higher is associated with a high risk of NF [2]. Our patient had an LRINEC score of 10 on admission, consistent with severe disease. Despite its utility, LRINEC should not delay urgent surgical evaluation. Diagnosis remains primarily clinical, especially when radiological findings are inconclusive or when advanced imaging (such as CT or MRI) is not readily available. In resource-limited or emergent settings, the "finger test", which assesses fascial integrity through blunt dissection, may aid in diagnosis and has been reported to have a sensitivity of 100% and a specificity of 80% [15]. Prompt surgical intervention is the cornerstone of NF management [16]. Debridement, and in advanced cases, amputation, is essential to remove necrotic tissue and control infection. Antibiotics alone are insufficient due to poor drug penetration in necrotic fascia [17]. In our case, the patient underwent extensive debridement and above-knee amputation within 24 hours of arrival at our center. However, this occurred more than 24 hours after symptom escalation at the referring facility. Despite initial postoperative improvement in consciousness and infection parameters, the patient deteriorated on the fourth hospital day and died from septic shock on day five.

The causative organism in this case was identified as *Enterococcus avium*, a rare pathogen in human NF. *E. avium* is a Gram-positive, catalase-negative coccus formerly classified under Group Q streptococci. It is typically found in the intestinal flora of birds, especially poultry, and has low virulence in healthy individuals [18–20]. However, in immunocompromised hosts, including those with diabetes mellitus, it can cause severe infections such as bacteremia, endocarditis, and intra-abdominal abscesses [18, 20]. The literature on *E. avium* as a causative agent of NF is extremely limited. Only a few case reports, including one involving Fournier's gangrene, have identified *E. avium* in necrotic soft tissue infections [21]. Our case thus contributes to the scarce literature, being among the first reported instances of NF of the lower limb caused by *E. avium*. The culture from wound swabs showed *E. avium* resistant to clindamycin, gentamicin, levofloxacin, and penicillin, but susceptible to linezolid, vancomycin, tetracycline, cotrimoxazole, and erythromycin. Unfortunately, definitive antibiotic adjustment based on culture sensitivity was not implemented in time due to the patient's rapid deterioration and death.

This case also underscores the importance of comorbid diabetes mellitus in NF. DM is present in up to 70% of NF cases and is associated with poor wound healing, increased susceptibility to infection, and higher amputation and mortality rates [22]. In our case, the patient had a poorly controlled 8-year history of DM and had not received consistent treatment for over six years. These factors likely contributed to the fulminant course and poor outcome despite surgical and intensive care. Mortality in NF remains high, ranging from 20% to 40%, and increases with delays in diagnosis, extensive necrosis, comorbidities, and inadequate initial management. Early surgical debridement—ideally within the first 24 hours—is associated with significantly improved survival. In this case, although surgery was performed promptly upon referral, the initial delay at the first hospital and the lack of targeted antibiotic therapy may have contributed to the unfavorable outcome [5, 6].

Conclusion

In conclusion, this case highlights the importance of early diagnosis and aggressive treatment of necrotizing fasciitis, especially in diabetic patients who are at higher risk for severe infection. The identification of *Enterococcus avium* as the causative agent, although rare, shows that uncommon pathogens can still lead to serious outcomes in immunocompromised individuals. Clinicians should be alert to signs of necrotizing fasciitis in patients with unusual skin wounds and systemic symptoms. Prompt surgical intervention, appropriate antibiotic therapy, and intensive supportive care are essential to improve survival and reduce complications in this life-threatening disease.

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Conflict of interest

The authors declare no conflict of interest.

Consent to participate

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and every effort will be made to conceal their identity; however, anonymity cannot be guaranteed.

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