

## Case report

Pleural empyema due to *Enterococcus* species: An uncommon etiologySrujana Mohanty<sup>a,\*</sup>, Sourin Bhuniya<sup>b</sup><sup>a</sup> Department of Microbiology, All India Institute of Medical Sciences, Bhubaneswar, 751019, Odisha, India<sup>b</sup> Department of Pulmonary Medicine & Critical Care, All India Institute of Medical Sciences, Bhubaneswar, 751019, Odisha, India

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## ABSTRACT

We report a case of empyema due to *Enterococcus faecium* in a 50-year-old woman with no apparent severe immune system impairment, except for underlying thyroid disorder and hypochromic anaemia. Appropriate antibiotic therapy with parenteral amoxicillin-clavulanate with gentamicin, tube drainage and other supportive therapy resulted in a favourable outcome and the patient was discharged after 3 weeks of hospitalization. Though uncommon, the possibility of *Enterococcus* species should be kept in mind as a causative agent of thoracic empyema, especially in adults presenting from the community.

## 1. Introduction

Organisms belonging to the genus *Enterococcus* are gram-positive, facultatively anaerobic, oval-shaped cocci that usually exist as commensal inhabitants of the gastrointestinal and genitourinary tract of humans. Traditionally, they act as opportunistic pathogens, particularly in elderly patients with serious underlying diseases or in other immunocompromised patients who have been hospitalized for prolonged periods, use invasive devices, and/or have received broad-spectrum antimicrobial therapy [1,2]. Usual clinical presentations consist of bacteremia and endocarditis, urinary tract infections, meningitis, intra-abdominal and pelvic infections, and skin and soft tissue infections [1,2].

Pleural empyema due to *Enterococcus* species is an uncommon entity and usually found in patients with underlying immune system impairments [3–5]. We report a case of empyema due to *Enterococcus* species in an adult patient with no apparent severe immune system impairment, which is a rare clinical scenario.

## 1.1. Case report

A 50-year-old woman presented with left-sided pleuritic chest pain, cough with scanty expectoration and fever of one-month duration that usually occurred in the evening but used to subside on local medication. The patient had no relevant medical or family history of hypertension, diabetes mellitus or contact with a tuberculosis patient. On examination, she had blood pressure 106/62 mmHg, pulse rate 86/min, respiratory rate 24/min and temperature 39.4 °C. Chest examination showed

decreased vesicular breath sounds with dullness to percussion over the left lower chest (infrascapular area) with moderate tenderness of the left upper quadrant. Incidentally, she was found to have a neck swelling moving with deglutition (size, approximately 8 × 7 cm) which on further examination revealed an enlarged thyroid gland.

Laboratory studies showed a normal total leukocyte count of  $10.5 \times 10^9/L$  (80% polymorphs, 15% lymphocytes, 4% monocytes) with an elevated absolute neutrophil count of  $8.37 \times 10^9/L$ , low hematocrit 27.8%, low hemoglobin level 81 g/L and raised red cell distribution width of 15.6%. She had low levels of mean corpuscular volume (71.47 fL), mean corpuscular haemoglobin (20.82 pg) and mean corpuscular haemoglobin concentration (29.14 g/dL) suggesting a microcytic hypochromic blood picture. Other notable laboratory findings were elevated thyroid stimulating hormone of 13.60 mIU/L, low free thyroxine (FT4) level of 0.37 ng/dL and low albumin level of 2.8 g/dL. All other laboratory parameters including random blood sugar level and serum electrolytes were within normal range. The patient tested negative for anti-HIV-1/2 antibodies, anti-HCV antibodies and Hepatitis B surface antigen. An ultrasound of the left hemithorax showed a well-defined thick-walled lesion with heterogenous echogenic contents measuring 11.8 × 7.3 cm suggestive of an encysted left pleural empyema. The patient was diagnosed as a case of left-sided pneumonia with encysted empyema with underlying hypothyroidism and microcytic hypochromic anemia. Thoracentesis was performed and approximately 200 ml of thick, cloudy yellowish pus aspirated and sent for bacterial culture along with a blood sample. She was administered parenteral antibiotics (amoxicillin-clavulanate and metronidazole) pending culture results. Simultaneously, appropriate supportive therapy

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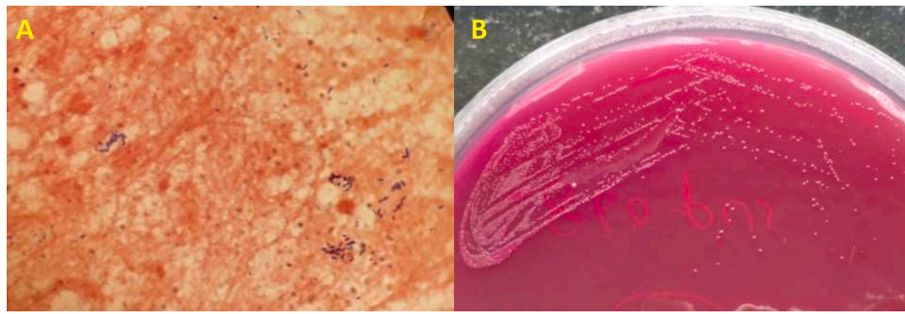


Fig. 1. Pleural pus aspirate showing (A) gram-positive cocci arranged in pairs, short chains and small clusters (1000 ×) and (B) growth of *E. faecium* on MacConkey agar plate.

was instituted for correction of anaemia and hypothyroid status.

Gram smear of the pus aspirate showed numerous polymorphs with ovoid gram-positive cocci, in pairs, short chains and small clusters (Fig. 1A). Culture yielded pure growth of smooth, catalase-negative, magenta coloured colonies on MacConkey agar plates after overnight incubation at 37 °C (Fig. 1B) identified as *Enterococcus faecium* by VITEK automated platform (bioMérieux, Marcy l'Etoile, France). In a standard antimicrobial disc-diffusion test, the isolate was susceptible to penicillin, ampicillin, high-level gentamicin, levofloxacin, vancomycin, teicoplanin and linezolid but resistant to doxycycline. Other routine microbiological investigations including blood cultures and cartridge-based nucleic acid amplification test of the pus aspirate for tuberculosis were non-contributory. Antibiotic therapy with parenteral amoxicillin-clavulanate was continued with addition of gentamicin along with continuation of tube drainage and other supportive therapy. The patient improved gradually, fever and pleuritic pain subsided and the effusion resolved gradually. She was discharged after 3 weeks of hospitalization with advice of a 2-week course of oral amoxicillin-clavulanate and regular follow-up at the hospital.

## 2. Discussion

Pleural empyema due to *Enterococcus* species is an uncommon entity and has not been widely reported except in few studies and some case reports from the West [3–9]. Further, in a retrospective review of 102 patients treated for empyema thoracis at the Royal Melbourne Hospital, Australia, over a 14-year period between January 1976 and December 1989, *Enterococcus* species were found in 18 patients (16% of positive cultures) [10]. A Medline search in English language literature from 1966 for enterococcal empyema from the Asian subcontinent uncovered only two studies from North India [11,12] and one from Northeast India [13] in which *Enterococcus* species accounted for a single isolate in culture-positive cases of empyema thoracis. Apart from these, single instances of enterococcal empyema have been reported from Taiwan [14,15], China [16], and Japan [17].

Empyema due to *Enterococcus* species has usually been found in patients with underlying immune system impairments, such as hematologic disorders, cancer, solid organ transplant, HIV, cirrhosis, alcoholism and cigarette smoking [3–5,16]. Some cases with uncommon associations/co-morbidities have recently been described such as living donor for liver transplantation [14], nephrotic syndrome [15], and asplenia [9] raising awareness for additional risk factors. In the present case, apart from underlying thyroid disorder and hypochromic anaemia, the patient had no apparent severe immune system impairment. However, the exact contribution of her underlying co-morbidities to the progression of her respiratory disease remains speculative. The major species involved are *E. faecalis* and *E. faecium* and rarely *E. casseliflavus* [3–5,8,9,17]. Of the two common species, *E. faecium* is known to exhibit a higher resistance pattern compared to *E. faecalis*, though empyema caused by highly drug-resistant strains of both *E. faecium* (vancomycin-resistant) and *E. faecalis* (linezolid-resistant) have been reported [9,

14]. The isolate in the present case, however, was susceptible to all the antimicrobial agents tested and the patient had a successful outcome with the prescribed antimicrobial agents. Enterococci usually exist as commensal bacteria mostly in the gastrointestinal tract of man and animals and less frequently in the vagina and oral cavity. Invasive infections can be attributed to their ability to persist on harsh environments and elaboration of various virulence factors consisting of both extracellular toxins and proteases as well as cell surface associated proteins [2,18].

## 3. Conclusion

Thoracic empyema continues to be a diagnostic and therapeutic challenge despite improvements in antimicrobial therapy and the existence of multiple options for drainage of the infected pleural space. Of the three phases of empyema - exudative (stage I), fibrinopurulent (stage II), and organizing (stage III) which represent a continuously evolving process, only the stage I empyema can be arrested by appropriate antibiotic therapy and thoracentesis or chest tube drainage [19]. As the knowledge of bacteriology of thoracic empyema is central to patient care, reliable identification and speciation of culture-positive isolates is crucial for administration of appropriate antibiotics and assuring a good outcome. Though uncommon, the possibility of *Enterococcus* species should be kept in mind as a causative agent of thoracic empyema, especially in adults presenting from the community.

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