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Case Report

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Rarest of the Rare Case: Vancomycin-Resistant, Enterococcus Avium-Associated Bacteremia

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ABSTRACT

Background: Enterococcus *Avium* (E. *Avium*), a rare species among enterococci, is an infrequent human pathogen. Vancomycin-resistant enterococci are emerging as significant nosocomial pathogens, particularly in immunocompromised patients. In India, the prevalence of vancomycin resistance among enterococci ranges from 0–30%, with *E. avium* accounting for 0.94% to 9.4% of isolates.

Methods: We report a case of a 61-year-old female patient with a history of seizures and chemical pneumonitis, admitted to AIIMS Raipur. During her hospital stay, the patient developed septic shock. Blood cultures revealed the presence of vancomycin-resistant Enterococcus avium. The patient was treated with linezolid, which led to improvement in sensorium. However, she subsequently developed ventilator-associated pneumonia and recurrent septic shock, ultimately resulting in her demise.

Results: In this case, the clinical significance of VRE-avium as an emerging nosocomial pathogen. Although rare, *E. avium* may cause serious bloodstream infections with high morbidity and mortality, especially in critically ill patients. Early detection and prompt antimicrobial therapy, such as linezolid, are essential. The case also underscores the challenges in managing Vancomycin-resistant enterococci (VRE) infections due to limited therapeutic options and a high risk of complications.

Conclusion: This case emphasises the importance of considering *E. avium* as a potential pathogen in nosocomial infections and underlines the need for vigilant antimicrobial stewardship and infection control practices. Vancomycin resistance in *E. avium* should be regarded as a serious threat in hospital settings.

Key-words: Enterococcus avium, Vancomycin-resistant enterococci (VRE), Bacteremia, Nosocomial infection, Septic shock, Linezolid, Ventilator-associated pneumonia, Emerging pathogen

INTRODUCTION

Enterococci are gram-positive nosocomial anaerobic bacteria commonly isolated from the alimentary tract [1]. Out of various culturable and non-culturable bacteria isolated from the gut, *Enterococci* are a minor population and appear to have a symbiotic relationship with the immune system and the other bacteria [2,3].

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However, with the advent of antibiotics, their usage has dramatically increased the colonisation of the GI tract by enterococci. Broad-spectrum antibiotics administration, like Cephalosporins, causes downregulation of antimicrobial peptide RegIIIγ, which favours VRE colonization [4,5]. Increased stomach pH, typically due to the use of proton pump inhibitors, a treatment frequently employed in critically ill patients to lower the incidence of aspiration pneumonitis, may also contribute to the colonization and overgrowth of enterococci in the gut [6,7]. Most importantly, their unusual capacity to exchange genetic information among themselves and other genera is believed to facilitate their emergence as a significant nosocomial pathogen despite low virulence [8].

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More than twenty species of *Enterococcus* have been isolated which are pathogenic to humans have been described, with *Enterococcus* faecalis and *Enterococcus* faecium accounting for more than 90% of cases of enterococcal bacteremia [7,9-12]. One of the species in the genus *Enterococcus* is *E. avium,* which was formerly known as group Q streptococcus. *E. avium* is a rare human infection that can be isolated from the gastrointestinal tracts of humans, dogs, and birds. Although it is found in many people's gastrointestinal tracts as a normal part of the flora, it is a rare pathogen in humans, restricted to the abdominal cavity and includes those of the pancreas, gall bladder and spleen [8,10,12].

We hereby report a rare case of Hospital-acquired bacteremia caused by *E. avium*. To our best knowledge, there are very few cases of vancomycin-resistant *E. avium* reported [11-13].

CASE PRESENTATION

A 61-year-old female, a known case of diabetes, hypertension and hypothyroidism, came from a nearby village to AIIMS Raipur with shortness of breath and chest pain. Patients give a history of multiple episodes of seizures, rolling of eyes and tongue biting. Following this, kerosene oil was given orally with the notion that this would stop the seizures [14]. Patients had similar complaints of seizures 3 months back later developed into right-sided hemiparesis.

General Physical Examination

- ✓ GCS 13/15($E_3V_4M_6$) with 80% SpO_2 at room air. Radiological examination revealed right lower lobe consolidation and collapse. On admission, routine investigation was within normal limits, and blood culture was reported negative.
- ✓ A provisional diagnosis of CVA with recurrent seizures, and chemical pneumonitis with acute respiratory distress was made and accordingly, treatment including Inj. Piperacillin-tazobactam was started.
- ✓ However, during the stay, the patient failed to maintain saturation and was intubated. She was having persistent fever spikes and gradually showed features of septic shock. The general condition of the patient started worsening, and was shifted to the intensive care unit with ventilatory support. Inj. Polymyxin and Inj. Vancomycin was included in the treatment protocol.
- ✓ Repeat investigation revealed neutrophilic leukocytosis, and raised CRP levels with blood culture positive for Vancomycin-resistant *Enterococcus Avium*. Following this Inj vancomycin was changed to vancomycin. Linezolid for 14 days. 48 hours after the new treatment, no new episodes of fever were documented. Patient's sensorium improved, and ventilatory support was tapered down. The repeat blood culture tested after two weeks was reported negative.
- ✓ But later, the patient developed ventilator-associated pneumonia and again landed in septic shock and disseminated intravascular coagulation. Following this, the patient succumbed to infection.

DISCUSSION

Enterococci, a part of normal intestinal flora, have emerged as the major pathogens causing high mortality in patients with enterococcal bacteremia (EAB), especially with immunocompromised status [15]. To date, 23 Enterococcus species pathogenic for humans have been described [10], *E. faecalis* and *E. faecium* accounting for more than 90% of cases of enterococcal bacteremia. The reported distribution of *E. avium* ranges between 0.94% and 9.4% in India [12,10]. In one of the India-based studies, a single isolate of *E. avium* was reported among 150 *Enterococcus* isolates. [13].

Association of Enterococcus with nosocomial and community-acquired infections, including urinary tract, bloodstream, and intraabdominal infections, as well as meningitis and endocarditis, has been noted. Endogenous acquisition may disseminate via cross-infection among hospitalized patients, especially following instrumentation or loss of the normal host barrier is common. Bloodstream infections are the third most common infections caused by these organisms [13].

E. avium is responsible for several human infections identified in urine and sterile sites like blood and cerebrospinal fluid. Despite its low virulence, *E. avium* can lead to a high mortality rate in bacteremia patients, especially those with severe underlying conditions [14,16]. As reported, Enterococcus is naturally resistant to all beta-lactam antibiotics and to clinically achievable amounts of trimethoprim-sulfamethoxazole, aminoglycosides, and lincosamides (*in vivo*) [15]. Clinical

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Enterococcus isolates with resistance to macrolides and tetracyclines have been reported in various literature [16,1]. The emergence and spread of VRE species have gathered greater attention on this genus [10]. In an India-based study, Fernandes *et al.* reported 60 cases out of which the highest frequency of resistance to high-level gentamicin (33.30%), and one-third (33.30%) of the isolates were multidrug-resistant. In India, the prevalence of VRE has been reported to be between 0-30 per cent [13]. The percentage of nosocomial enterococci resistance to vancomycin has increased from 0.3% to 21% [17]. To date, only a few cases of vancomycin-resistant *E. avium* (VREA) have been reported, but none in India [17,18]. Lohikoski *et al*. reported two cases of VREA. A Japan-based study reported a case of Minocycline-intermediate resistance *E. avium* isolated from a 61-year-old man with colorectal adenocarcinoma [17].

Some isolates show vancomycin susceptibility, yet fail to respond to vancomycin monotherapy in a relevant proportion of infections [15]. A retrospective study reported *E. gallinarum* group acquired BSI treated with daptomycin (median dose of 6.12 mg/kg/die) or linezolid 600 mg q 12 h was independently associated with an increased microbiological cure and decreased treatment failures, with no differences in hospital mortality [16]. For susceptible isolates, Raza *et al.* suggest aminopenicillins (i.e. *ampicillin and amoxicillin*) as first-line treatment for EAB infections, in combination with an in vitro-active aminoglycoside (e.g. gentamicin, streptomycin) in cases of endocarditis. Treatment options for VRE include tigecycline, linezolid, daptomycin, quinipristin-dalfopristin, platensimycin, nitrofurantoin and fosfomycin, with some reports of resistance as well [19]. Usage of antibiotics is an art, and thus use of daptomycin and linezolid is reserved only in cases of beta-lactam allergy and/or resistance or selected cases in which the antibiotic tissue diffusion is limited (e.g. CNS infections and endophthalmitis).

Thus, treating enterococcal infection is a primary challenge for clinicians as there is a lack of any standard regimen. The highlights mentioned above may be taken as a warning concerning the potential rise of *E. avium* resistance in healthcare facilities, along with reemphasising the fact that enterococci are one of the leading causes of nosocomial bacteremia [14]. EAB is the most frequent presentation as compared to other presentations [15,16], with limited therapeutic options in treating enterococcal infections. Usage of antibiotics is an art, and to spare the ecological impact, judicious use is highly recommended.

CONCLUSIONS

In conclusion would like to highlight that there is an increasing prevalence of enterococcal nosocomial infection increasing trend in vancomycin resistance is being reported. The presence of enterococci as intestinal flora, the ever-increasing use of medical devices, prolonged hospitalization, and most importantly, irrational and improper antibiotic therapy have resulted in the emergence of VRE. Linezolid was seen to produce improvement in the patient's condition, but due to superadded factors patient succumbed. Thus, VRE poses important problems to patients, physicians, and the health care system. The association of *E. avium* with bacteremia needs further research to establish susceptibility to antimicrobial agents, including vancomycin.

CONTRIBUTION OF AUTHORS

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