CASE REPORT

Unilateral complicated pleural empyema in a patient with bronchial asthma due to clindamycin-resistant *Prevotella buccae*

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ABSTRACT

Prevotella buccae (P. buccae) is a gram-negative obligate anaerobe mainly associated with infections of odontogenic origin. Non-oral monomicrobial infection by these obligate anaerobic bacteria is rare. Only a few cases of monomicrobial non-oral infections by *P. buccae* have been reported in the literature. We are reporting a case of unilateral complicated pleural empyema in a patient with bronchial asthma infected by *P. buccae*. Pleural fluid aerobic culture and blood culture reports were sterile. No acid-fast bacilli were detected by Acid Fast Bacilli (AFB) staining, and cartridge-based nucleic acid assay test (CBNAAT) reports were negative for *Mycobacterium tuberculosis*. The isolate, *P. buccae* was found susceptible to Metronidazole (MIC = 3 μg/ml) and resistant to Clindamycin (MIC = 256 μg/ml). In view of rising trends of antimicrobial resistance among anaerobes, it is recommended to perform anaerobic culture and sensitivity testing in clinically suspected cases of pleuropulmonary infection for appropriate diagnosis and optimal patient management. Clindamycin should be used with caution for empiric treatment.

KEYWORDS: clindamycin resistance; pleural empyema; *Prevotella buccae*

INTRODUCTION

P. buccae is a gram-negative, non-pigmented, bile-sensitive obligate anaerobe. It is one of the most commonly encountered and clinically important *Prevotella* species [1]. Though it is mainly associated with infections of odontogenic origin, it has also been reported in cases of non-oral infections. Only a few cases of monomicrobial non-oral infections by *P. buccae* have been reported in the literature [2-4]. We have recently diagnosed a rare case of pleural empyema caused by *P. buccae* in a patient with bronchial asthma. Moreover, the *P. buccae* strain was clindamycin-resistant, which is a commonly prescribed antimicrobial agent used for the treatment of anaerobic infections.

CASE REPORT

A 37-year-old male with a known case of bronchial asthma for the last eight years presented to the pulmonary medicine outpatient department with the chief complaint of right-sided dull aching pain in the subcoastal region, which was exaggerated on inspiration. There was an accompanying high-grade fever with chills and shortness of breath for 15 days. The patient was on follow-up maintenance treatment with inhaled corticosteroids and long-acting bronchodilators (budesonide 400 mcg and formoterol 6 mcg) twice a day. He was non-alcoholic and did not reveal a history of any other comorbidities such as diabetes mellitus, malignancy, or immunosuppressive diseases.

A chest X-ray showed moderate right-sided pleural effusion (Fig. 1). Ultrasound of the abdomen showed hepatomegaly with Grade II fatty liver and right pleural effusion. Contrast Enhanced Computed Tomography (CECT) of the thorax revealed moderate effusion accompanied by underlying lung collapse. Also, multiple enlarged mediastinal lymph nodes were noted in pre-vascular, sub-carinal, sub-aortic, paratracheal, paraaortic, and para-esophageal stations. Pleurocentesis showed foul-smelling, turbid fluid, and hence an intercostal drain (ICD) was inserted. Antibiotic coverage included Piperacillin-Tazobactum and Clindamycin was given. Pleural fluid aerobic culture and blood culture reports were sterile. No acid-fast bacilli were detected by Acid Fast Bacilli (AFB) staining, and cartridge-based nucleic acid assay test (CBNAAT) reports were negative for *Mycobacterium tuberculosis*. For anaerobic culture, a sample was inoculated into Robertson Cooked Meat Broth (RCM) for 24 hours. Subcultures were made on non-selective media, Brucella Blood Agar (BBA), and selective media, Neomycin blood agar (NBA), with metronidazole disc (5 ug). Plates were incubated

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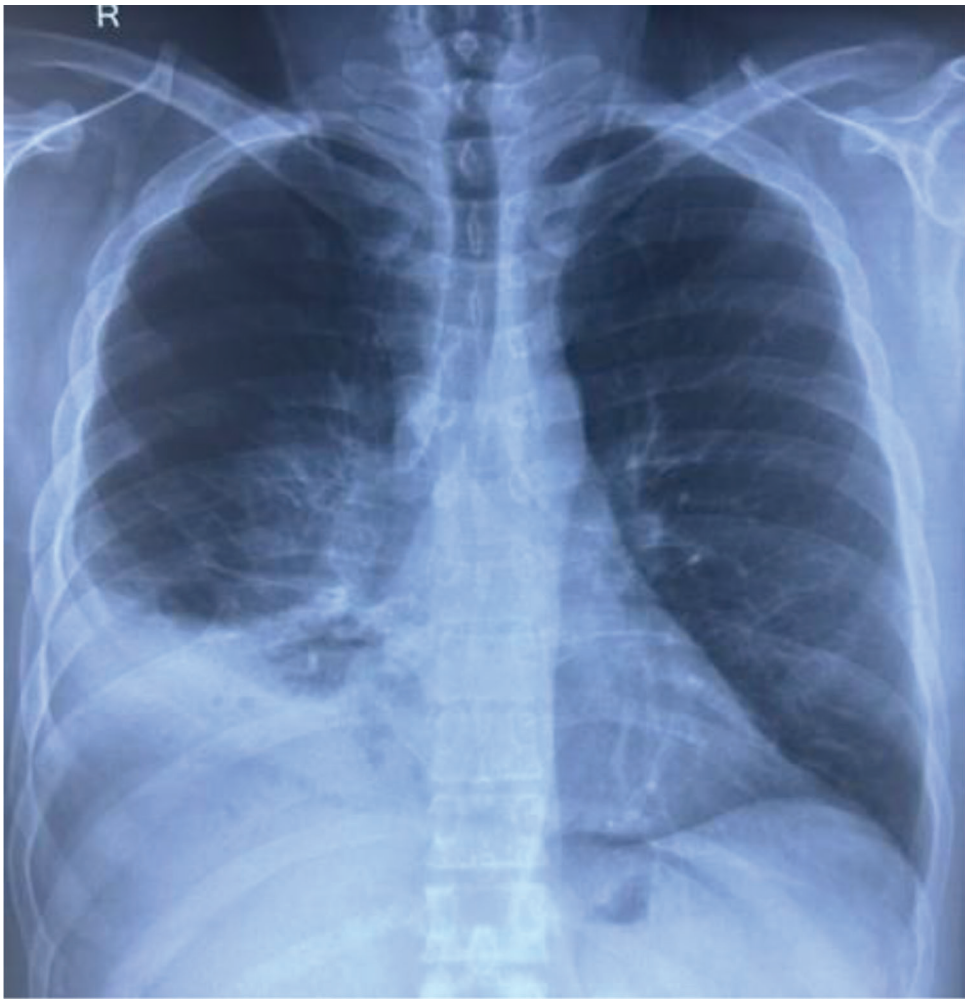

Fig. 1. Chest radiograph (posteroanterior view) showing moderate pleural effusion.

at 37°C in a Gas Pack Jar (HiMedia Laboratories Pvt. Ltd.). On both BBA and NBA, single-type, round, shiny, convex, transparent, non-hemolytic colonies with a zone of inhibition around the metronidazole disc were obtained after 72 hours of anaerobic incubation (Fig. 2A). Gram-staining from the colonies exhibited gram-negative rods. The presumed anaerobic isolate was confirmed by conventional biochemical tests [5], followed by the VITEK automated system (BioMeuriex, France). The isolate was confirmed as *P. buccae*. The antimicrobial susceptibility testing was performed by the Etest method for Metronidazole and Clindamycin. Interpretation was done according to the CLSI M100 33rd edition guidelines [6]. The isolate was found susceptible to Metronidazole (MIC = 3 µg/ml) and resistant to Clindamycin (MIC = 256 µg/ml) (Fig. 2B). Additionally, a complete blood count examination revealed raised WBC counts of 28.03/mm^3 (Ref. range: 4–11/mm^3), neutrophilia (84 %; Ref. range: 40-70%) with absolute neutrophil count of 23.45x10^3/MicroL (Ref. range: 1.50–7 x10^3/MicroL) and relative lymphocytopenia (9%; Ref. range: 20–40%). Pleural fluid LDH levels were detected to be highly raised at 30050.04 U/L (Ref. range: <50 U/L); Glucose decreased to 3.75 mg/dL (Ref. range: 70–140 mg/dL); and protein levels were 0.71 g/dL (Ref. range: 1-2 g/dL), suggesting an acute pyogenic infection. Follow-up USG after 5 days was suggestive of septations and pleural thickening; hence, Streptokinase was given intrapleural for 3 days. The ICD was removed after a few days when the empyema resolved and the patient had improved clinically.

DISCUSSION

Empyema, defined as the presence of bacteria or pus in the pleural cavity, is a serious infection with high morbidity and mortality (15%–20%) [7]. The predominant cause has been assumed to be bacterial pneumonia, in which bacteria breach the visceral pleura and establish an infected parapneumonic effusion leading to empyema. Aerobic bacteria such as *Streptococcus spp.*, *Staphylococcus aureus*, *Enterobacterals* and *Pseudomonas* species are the major etiological pathogens reported [8]. Though anaerobic bacteria are also important etiological agents; they are less commonly reported due to a lack of culture facilities and robust technical expertise involved in their isolation and correct identification.

P. buccae is a gram-negative anaerobic bacillus that is part of the normal human oral flora. It is mainly involved in orodental infections, often mixed infections, as are other

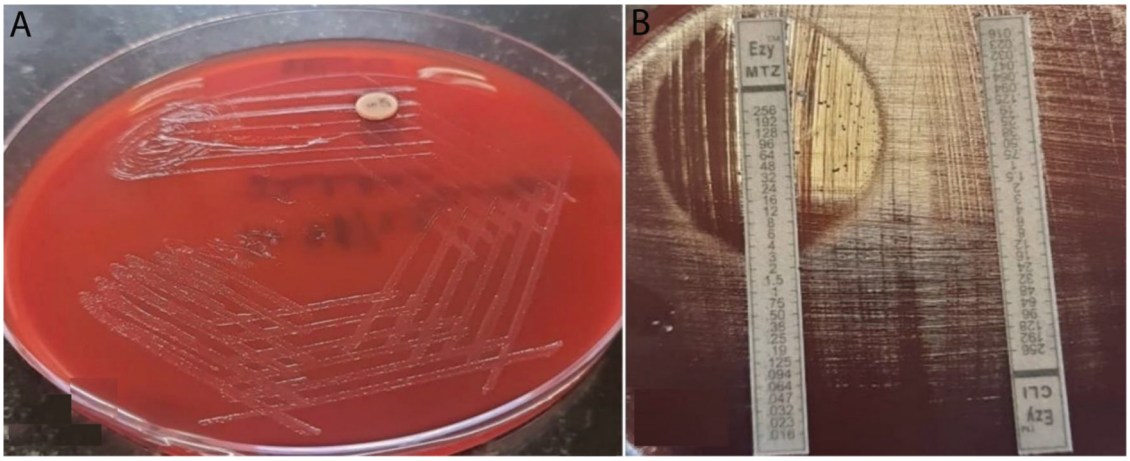

Fig. 2. A. Growth of *P. buccae* on Neomycin blood agar with a zone of inhibition to metronidazole disc; **B.** Antimicrobial susceptibility by E-strip method depicting susceptibility to Metronidazole (MIC- 3 μg/ml) and resistance to clindamycin (MIC-> 256 μg/ml).

anaerobic bacteria [1]. In the literature, only a few cases of monomicrobial infections with *P. buccae* have been reported. It has been previously isolated from cases of retropharyngeal abscess [2], breast abscess [3], and mediastinitis [4].

Dyrhovden R et al. established the diagnosis of *P. buccae* in cases of pleural empyema by massive parallel sequencing of the 16S rRNA and *rpoB* genes. In their study, one of the risk factors observed was chronic obstructive pulmonary disease similar to the present case. One of the notable findings of this study was that strict and facultative anaerobic oral bacteria were detected in the pleural empyema cases. The possible explanation was right-sided hematogenous spread. Infected venous blood follows the venous draining system to the right ventricle of the heart and is pumped into the pulmonary arteries, ending up in the capillary network of alveoli and parts of the visceral pleura and thereby establishing pyogenic infections in the lung parenchyma or pleural cavity [8]. As *P. buccae* is predominantly an oral bacteria, this may be a plausible explanation for the isolation of this anaerobic bacteria in this case as well. Monomicrobial isolation of *P. buccae* in pure culture in our samples confirms with certainty its pathogenic role in the disease.

Globally, an increase in antimicrobial resistance among anaerobic bacteria, including *Prevotella*, is being observed [9]. In the case described here, the strain was susceptible to metronidazole and resistant to clindamycin. In a multicenter survey conducted by Ulger Toprak N et al. [10] on the antimicrobial susceptibility of *Prevotella* species, clindamycin resistance was detected in 33.7% of isolates. All the isolates were sensitive to metronidazole, coinciding with the findings of the present case.

CONCLUSIONS

Although pleural empyema caused solely by anaerobic bacteria is rare, strong clinical suspicion is required, especially in patients with chronic obstructive pulmonary disease and pre-existing orodental infections. Anaerobic cultures must be performed for all microbiological samples taken in this context, besides aerobic cultures. In view of the rising trend of clindamycin resistance, this antibiotic should be used with caution for the empiric treatment of pleuropulmonary infections.

Informed consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Conflict of interest

The authors declare that they have no competing interests.

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