



CASE REPORT

Eikenella corrodens and *Porphyromonas asaccharolytica* pleural empyema in a diabetic patient with obstructive sleep apnea syndrome on noninvasive ventilation[☆]

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PALAVRAS-CHAVE

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Ventilação não
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Apneia obstrutiva do
sono;
Eikenella corrodens;
Porphyromonas

Abstract *Eikenella corrodens* is a normal inhabitant of the human oral cavity and gastrointestinal and genitourinary tracts.

Pleuropulmonary infections by this microorganism are uncommon. Pulmonary aspiration is a chief predisposing condition. Although the outcome is usually favorable, its distinctive antibiotic sensitivity pattern makes bacterial identification an important feature in dealing with this infection.

The authors report a case of pleural empyema caused by co-infection with *E. corrodens* and *Porphyromonas asaccharolytica*, in an immunocompetent diabetic patient with obstructive sleep apnea syndrome, followed by a discussion on the role of noninvasive ventilation in the development of this infection.

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Empiema pleural por *Eikenella corrodens* e *Porphyromonas saccharolytica* numa doente diabética sob ventilação não invasiva por síndrome de apneia obstrutiva do sono

Resumo A *Eikenella corrodens* é um microrganismo habitualmente encontrado na mucosa oral, trato gastrointestinal e trato geniturinário de humanos.

Os casos de infeção pleuropulmonar por este agente são raros em indivíduos imunocompetentes, sendo a aspiração um fator importante na sua patogenia. Apesar de apresentar geralmente um prognóstico favorável, o reconhecimento desta infeção é essencial dado o perfil de sensibilidades característico.

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Os autores apresentam um caso de empiema pleural por *E. corrodens*, em coinfeção com *Porphyromonas asaccharolytica*, numa doente diabética imunocompetente com síndrome de apneia obstrutiva do sono, discutindo o papel da ventilação não invasiva como fator predisponente da referida infeção.

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Case report

A 69-year-old female, with a history of obesity, diabetes mellitus, arterial hypertension, dyslipidemia, New York Heart Association class II heart failure, atrial fibrillation and obstructive sleep apnea syndrome (OSAS) on non-invasive ventilation – nocturnal continuous positive airway pressure (CPAP) delivered through an oronasal mask – was evaluated for shortness of breath and dry cough which had developed over seven days. On admission, she was afebrile, with mean arterial pressure of 114 mmHg, pulse of 93 bpm and respiratory rate of 24/min, with hypoxemic respiratory insufficiency. Auscultation revealed diminished breath sounds and tactile fremitus over the left chest. Her teeth were in reasonable condition, with no suspicious lesions in the oropharynx. Physical examination was otherwise unremarkable. Laboratory markers of inflammation were elevated and chest roentgenogram demonstrated a large left pleural effusion. The patient underwent thoracentesis that revealed a purulent fluid collection. A chest tube was inserted, attached to water-seal drainage, and ceftriaxone plus metronidazole were empirically prescribed. A non-beta-lactamase-producing strain of *Eikenella corrodens* was isolated from the pleural fluid on the sixth day; antibiotics were then changed to penicillin-G benzathine. A strain of *Porphyromonas asaccharolytica* was subsequently isolated from the same sample. All blood and sputum cultures, as well as acid-fast bacillus and fungal cultures of pleural fluid, were negative.

The patient remained afebrile over the following days, with no signs of respiratory distress by day 5, when the chest tube was removed. Evaluation with flexible bronchoscopy on the seventh day showed no endobronchial lesions and analysis of the bronchoalveolar lavage fluid was negative for microorganisms and cancer cells. Transthoracic echocardiography revealed pulmonary hypertension in correlation with OSAS.

The patient was discharged from hospital on day 23, on respiratory kinesitherapy and amoxicillin-clavulanate for two additional weeks. Pre-discharge chest roentgenogram showed residual pleural effusion. The patient remained well during follow-up two years after hospitalization.

Discussion

E. corrodens is a normal inhabitant of the oral cavity, gastrointestinal and genitourinary tracts, and it has been isolated from head and neck infections, as well as those associated with human bites.^{1,2} Other reported infections include endocarditis, osteomyelitis, parotitis, sinusitis, meningitis, cerebral abscess and chorioamnionitis.¹⁻⁴

E. corrodens is a slowly growing, microaerophilic gram-negative bacillus. Its identification is based on the characteristics of colonies, which have typically pitting morphology; these are usually small with brighter center, irregular contours and hypochlorite odor. Other features include failure to produce catalase from glucose and capacity to reduce nitrates to nitrites.^{2,3} Since it requires several-day incubation on routine aerobic cultures, clinical suspicion is crucial.

E. corrodens is also recognizable for its intrinsic resistance to antibiotics with anaerobic activity such as clindamycin and metronidazole.⁵ It is generally considered susceptible to penicillin-G and ampicillin, since most strains are non-beta-lactamase producers. Sensitivity to cephalosporins is variable.¹⁻³

P. asaccharolytica is a strict anaerobic gram-negative bacillus commonly found in gastrointestinal and genitourinary tracts.⁶ This bacterium develops into convex colonies, which are distinguishable due to their centripetal darkening appearance attributable to protoheme production. Although very few cases have been described, reported clinical presentations include soft-tissue infections, pleural empyema and appendicular abscess.

Most of the patients with pleuropulmonary infection by *E. corrodens* present as parapneumonic effusion, pleural empyema, pneumonia and pulmonary abscess.^{2,5,6} Many cases are associated with mixed infections by microaerophilic streptococci, *Streptococcus viridans*, *Bacteroides fragilis*, *Prevotella melaninogenica* and *P. asaccharolytica*, most of which are normal inhabitants of the oral cavity.^{2,3,7} The possibility of synergistic mechanisms between *E. corrodens* and streptococcal strains has been brought up by some studies.¹

Pleuropulmonary infections by *E. corrodens* are rare, particularly in immunocompetent adults; fewer than fifteen cases have been described. Host factors such as immunosuppressive conditions, underlying lung disease and oropharyngeal and gastrointestinal aspiration predisposing factors play an important role in the pathogeny of this infection.³ In fact, there is a close relationship between *E. corrodens* infection and neoplastic disease, alcoholism, diabetes mellitus, and chronic pulmonary and cerebrovascular disease, as well as poor dental hygiene and chronic glucocorticoid use.^{1-3,7}

Some of the studies suggest that OSAS can contribute to aspiration. Beal et al.⁸ reported that these patients are at an increased risk for pharyngeal aspiration when compared to normal patients. Gleeson et al.⁹ performed quantitative measurements of aspirated material in a standard population of patients, and showed that aspiration was negligible in normal volunteers without symptoms of sleep apnea. The exact reason for this is not totally clear, although it

may be due to factors generally found in patients with OSAS such as increased respiratory effort, higher body mass index and oropharyngeal anatomic abnormalities. In another study, Teramoto et al.¹⁰ demonstrated that the swallowing reflex is significantly impaired in patient with OSAS; the authors suggest that sleep apnea can cause impaired function of receptors and afferent nerves to the respiratory and swallowing brain centers, which can further predispose to aspiration.

Many patients with OSAS have symptoms suggestive of gastroesophageal reflux (GER), but there has not been a clear agreement on the precise association between these clinical entities. Due to the study design, Beal et al.⁸ could not determine whether aspiration was consequence of true pharyngeal aspiration, or the result of aspiration of refluxed gastric content, although none of the patients had symptoms of GER. Likewise, Kerr et al.¹¹ failed to determine a temporal association between sleep apnea and reflux. In fact, most of the studies reporting an increased frequency of GER disease in patients with OSAS have not been controlled¹²⁻¹⁴ and it is not known whether the relationship is causative or due to conditions usually shared by OSAS and GER patients such as obesity and alcohol ingestion.

Accordingly, there has been some uncertainty as to the role of CPAP in the predisposition for oropharyngeal aspiration. Even though Diaz et al.¹⁵ showed that CPAP reduced GER in patients with both OSAS and GER disease (which was interpreted as evidence that OSAS caused GER), this result may be unrelated to the effect of noninvasive ventilation on OSAS, but instead a direct consequence of CPAP on intraesophageal and resting lower esophageal pressures; Kerr et al.¹⁶ demonstrated that CPAP could decrease GER in patients without OSAS. On the contrary, Nishino et al.¹⁷ demonstrated that CPAP exerts an inhibitory influence on swallowing reflex, which could facilitate oropharyngeal aspiration.

Our report refers to a pleural empyema caused by co-infection with *E. corrodens* and *P. asaccharolytica*, in an immunocompetent diabetic patient with OSAS on CPAP, without symptoms of GER or other known predisposing factors for this infection. Extrapolating from this, it is our belief that noninvasive ventilation may have had an important role in the development of the disorder, either directly by facilitating oropharyngeal aspiration, or indirectly by inhibiting swallowing reflex, thus altering the normal breathing-swallowing pattern.

Further randomized studies are required to better assess the role of noninvasive ventilation in the development of pleuropulmonary infections.

Conclusion

E. corrodens should be considered as a possible causative agent when patients with presumed anaerobic infections fail to improve with standard treatment with clindamycin or metronidazole. Laboratory personnel and physicians should be aware of this in order to promote early diagnosis and prompt treatment.

The susceptibility pattern of *E. corrodens* and other likely microorganisms must be considered when a therapeutic regimen is chosen. Simultaneous use of more than one antibiotic may be required.

Despite not having been reported as an epidemiological context for the development of pleural empyema, it is our conviction that oropharyngeal aspiration of microorganisms facilitated by noninvasive ventilation may have been responsible for this infection.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data and that all the patients included in the study received sufficient information and gave their written informed consent to participate in the study.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

Conflicts of interest

The authors have no conflicts of interest to declare.

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