Intrathoracic infections due to *Eikenella corrodens*

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Eikenella corrodens, a fastidious facultative anaerobic Gram negative bacillus,¹ is part of the normal human oral flora. Although it has been implicated as the sole causative agent for certain infections,¹⁻⁴ its pathogenetic importance remains uncertain. *E. corrodens* has been isolated in respiratory tract infections, including pneumonia, abscess, and empyema, where detailed bacteriological investigations have been performed, but only in association with other microbes.^{2,3,5,6} It was recently isolated by transtracheal or percutaneous aspiration from seven patients with pneumonia or lung abscess,⁵ but in each case several other organisms were cultured. The present report shows that *E. corrodens* can be the sole cause of respiratory tract infection. The organism has an unusual antibiotic sensitivity and the therapeutic importance of this is illustrated by our case histories.

Case reports

CASE 1

A 52 year old man complained of a flu like syndrome, cough with purulent green sputum, chills, and fever one week after a syncopal episode. The respiratory rate was 28, temperature 37°C, and blood pressure 94/80 mm Hg. He had extensive periodontal disease. Cardiopulmonary and abdominal examination showed nothing abnormal. His white blood cell count was $17.3 \times 10^9/l$ with 90% neutrophils. A chest radiograph showed a left upper lobe abscess, which was not present on a chest radiograph obtained three weeks previously.

Gram stain of sputum showed many neutrophil leucocytes and occasional Gram positive cocci. After blood had been obtained for microbial cultures, he was treated with intravenous fluid and penicillin (12 million units daily). The next day he felt better and had an improved appetite. Later in the day, however, his blood pressure fell to 64/44 mm Hg when the rate of intravenous fluid administration was reduced. The hypotension was thought to be due to sepsis, so penicillin was stopped and he was treated with more fluid, dopamine, clindamycin (600 mg intravenously every six hours), and gentamicin.

Fever and chills recurred, and he remained febrile with a temperature up to 38.5°C for the next eight days. Bron-

choscopy showed swelling of the left upper lobe bronchi; all specimens were negative for malignant cells. On day 7 a Gram negative rod was cultured from one of the blood culture bottles, and this was identified as *E. corrodens* by morphological and biochemical criteria.^{1,2} The organism was resistant to clindamycin but sensitive to penicillin. All other blood cultures, both aerobic and anaerobic, were negative; sputum grew normal flora. On day 9 ampicillin was given and gentamicin and clindamycin were stopped. He then became afebrile and felt better and his appetite improved. Repeated attempts to wean him from intravenous fluids resulted in hypotension. Extensive investigation revealed hypoadosteronism, for which fludrocortisone was administered.

Amoxycillin was stopped after three months, when the chest radiograph showed that the abscess had resolved. Cultures for acid fast bacilli and fungi were negative.

CASE 2

A 44 year old white man, with a history of alcoholism and seizures, complained of nausea, anorexia, fever, increasing shortness of breath, and bilateral pleuritic chest pain of two weeks' duration. He had a history of depression, and had been drinking excessively during the past two weeks.

His temperature was 39.5°C, heart rate 140 beats/min and respiratory rate 44/min. Breath sounds were diminished bilaterally and end inspiratory crackles were heard. The clinical examination otherwise showed nothing abnormal.

The white blood cell count was $25.9 \times 10^9/l$ with 75% neutrophil leucocytes. The arterial oxygen tension (P_{aO_2}) was 38 and the carbon dioxide tension (P_{aCO_2}) 20 mm Hg (5.1 and 2.7 kPa) and pH 7.45 in room air. A chest radiograph showed bilateral lower lobe shadowing, a right lower lobe abscess cavity, and a pleural effusion. Gram staining of sputum showed many neutrophil leucocytes with mixed organisms. He was treated with oxygen, phenytoin, penicillin, and tobramycin.

Two days later the patient was still febrile. Penicillin treatment was discontinued and clindamycin was added. On the third day thoracentesis yielded 20 ml of non-putrid cloudy fluid with a white cell count of $13.1 \times 10^9/l$, 90% being neutrophils. Sputum culture grew normal flora, and blood cultures were negative. Bronchoscopy showed that the orifices of the middle and right lower lobe bronchi were erythematous, oedematous, and narrowed.

He remained febrile with a high leucocyte count despite tube thoracostomy. On the 11th day he underwent thoracotomy. Removal of a large volume of non-putrid pus (1600 ml) revealed a large abscess in the right lower lobe.

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causing collapse of the middle lobe. Lobectomy and decortication were performed, and two chest tubes left in situ. Postoperatively he continued to have a leucocytosis and fever while taking clindamycin.

The empyema fluid was submitted for aerobic and anaerobic cultures and grew *E. corrodens*, sensitive to ampicillin, carbenicillin, cephalothin, chloramphenicol, gentamicin, tobramycin, and tetracycline. Cultures for acid fast bacilli and fungi were negative. Clindamycin was discontinued and ampicillin started. This resulted in clinical recovery with disappearance of the fever and leucocytosis.

CASE 3

A 72 year old white woman was admitted for investigation of a peripheral lung mass on the chest radiograph. She was a heavy smoker with chronic obstructive lung disease. A limited thoracotomy showed squamous cell carcinoma of the pleura. Five days later, when she developed fever and a productive cough, the chest radiograph showed a pleural effusion, with shadowing and loss of volume in the left lower lobe. The sputum contained many neutrophils but grew normal flora only and blood cultures remained negative. Yellow fluid drained from the old chest tube site. On Gram staining the fluid contained many leucocytes but no organisms; *E. corrodens*, however, grew on culture. All other aerobic and anaerobic cultures were negative. Intravenous penicillin was given. *E. corrodens* was also sensitive to ampicillin, carbenicillin, cephalothin, tobramycin, gentamicin, chloramphenicol, and tetracycline. For the next three weeks her course was punctuated by episodes of chills and fever. These occurred at times when drainage from the pleural space was diminished, and it responded to incision and drainage. A second culture of the pleural fluid grew *E. corrodens* and *Haemophilus parainfluenzae*. She was discharged from hospital while continuing treatment with an oral cephalosporin.

Discussion

We report three patients who presented with thoracic infection due to *E. corrodens*. Two had a primary lung abscess, one in association with empyema; and the third, with carcinoma of the lung, presented with postoperative pneumonia and empyema. Two had *E. corrodens* bacteraemia. This report strongly suggests that *E. corrodens* was the sole cause of infection in these patients.

Respiratory tract infections due to *Eikenella corrodens* are not well recognised. Recognition of *E. corrodens* as the cause of an intrathoracic infection is particularly important since, as noted in this report, infections mimic anaerobic infections but have different antibiotic sensitivities. Anaerobic infections are effectively treated with clindamycin,⁷ whereas *E. corrodens* is invariably resistant to this antibiotic,⁸ as shown by our case reports.

We believe that the incidence of *E. corrodens* pleuropulmonary infections has been underestimated. This is because penicillin, to which *E. corrodens* is sensitive, is commonly used to treat aspiration pneumonia. *E. corrodens* is characteristically difficult to grow and, as exemplified in this report, only one of several cultures may be positive. Consequently, the infections were present for some time before the correct aetiological diagnosis was made. A pleuropulmonary infection that is clinically presumed to be anaerobic but fails to respond favourably to clindamycin should alert the clinician to the possibility that *E. corrodens* may be the causative agent.

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