CASE REPORT

Sphingomonas paucimobilis empyema caused by remote foreign body aspiration

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SUMMARY

Empyema secondary to foreign body aspiration is rare in adults. We present a case of empyema in a 77-year-old male patient related to a remote aspiration event during a dental procedure. A CT of the chest and bronchoscopy confirmed that a metallic foreign body was located within the right lower lobe bronchus. His pleural fluid culture revealed *Sphingomonas paucimobilis* which is a low-virulent opportunistic gram-negative bacilli and rarely causes infection. The patient received meropenem followed by levofloxacin and recovered uneventfully. The attempt of foreign body removal was failed due to chronic inflammation, and the patient refused further surgical management.

BACKGROUND

Foreign body aspiration (FBA) is uncommon in adults.¹ The predisposing factors for FBA include neurological disorders, dental procedures and the incidence increases with age.² The diagnosis is often difficult, because imaging often fails to detect foreign bodies.^{3 4} FBA causes many complications including acute dyspnoea, bronchiectasis, bronchial stricture, pneumonia and rarely empyema.^{2 5} Here, we present a case of empyema caused by *Sphingomonas paucimobilis* years after a dental procedure.

CASE PRESENTATION

A 77-year-old man presented with pleuritic chest pain and shortness of breath for 1 week. His medical history included hypertension, iron deficiency anaemia, diabetes, and he had an episode of pneumonia in the past. His home medications included lisinopril, metoprolol and aspirin. He was poorly compliant with medications and physician appointments. He was a retired office clerk who had smoked half to one pack per day for 45 years and stopped at age of 60. There was no history of recent travel or sick contacts. On examination, he was breathing ambient air comfortably with an oxygen saturation of 90%. Decreased breath sounds were noted at the right lung base.

INVESTIGATIONS

Laboratory data included a mild leucocytosis (14 300 cells/ μ L, neutrophils 85%, lymphocytes 9% and monocytes 6%), a low albumin (2.4 g/dL), normal liver function tests and normal troponin I and brain natriuretic peptide levels. A chest X-ray (CXR) revealed a large opacity in the right lower lung consistent with a large

effusion (figure 1). Subsequently, CT scan of the chest revealed loculated right pleural effusion and consolidation in right middle and lower lobes. In the middle of the consolidation, there was a 13×14 mm metallic foreign body within the right lower lobe bronchus (figure 2).

DIFFERENTIAL DIAGNOSIS

FBA was suspected. The patient subsequently recalled that a dental prosthesis was lost during a dental procedure about 8 years before this admission. Two years before this admission, he was admitted for pneumonia and the CXR at that time showed a patchy right lower lobe infiltrate (figure 3). The patient refused a CT scan of the chest at that time.

The differential diagnosis of his pleural effusion included parapneumonic effusion or empyema, given the history of FBA.

TREATMENT

The patient underwent bronchoscopy and the findings included the presence of imbedded dental crown which could not be removed because of severe inflammation. The patient subsequently underwent a thoracoscopy with parietal decortication and drainage of an empyema. He received intravenous ampicillin/sulbactam (3 gm, every 6 hours) since admission. A bronchoalveolar lavage yielded *Escherichia coli*, but the pleural fluid culture grew *S. paucimobilis*. *E. coli* was sensitive to ampicillin, levofloxacin and cefazolin. The susceptibility test for *S. paucimobilis* was not done because of the lack of standardised protocols. After a medical literature review, ampicillin/sulbactam was changed to intravenous meropenem (1 g, every 8 hours) on day 4 to target both of *E. coli* and *S. paucimobilis*. The patient improved, and then meropenem was de-escalated to oral levofloxacin (500 mg, daily) on day 6.

OUTCOME AND FOLLOW-UP

He remained afebrile and was discharged on a 30-day course of oral levofloxacin on day 7. He refused a follow-up bronchoscopy and further surgical management and recovered uneventfully.

DISCUSSION

In adults, FBA is more common in patients older than 50 years.⁴ Symptoms include choking, cough, fever, breathlessness and wheezing.⁴ In most of the cases, patients can identify the aspiration event,

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Figure 1 Portable chest X-ray on admission.

which leads to further imaging. CXR is the common initial imaging modality; however, the sensitivity and specificity of CXR are not ideal.⁶ In our case, a nodule was reported on the patient's prior CXR, but a foreign body was not suspected because of the lack of symptoms and history of aspiration. Two years later, when the patient became symptomatic, CXR showed a large opacity in right lower lung consistent with pleural effusion. Subsequent CT scan of the chest revealed the foreign body in right lower lobe bronchus and confirmed loculated pleural effusion suggesting chronic inflammation. CT scan of the chest carries higher sensitivity, but a negative CT cannot rule out FBA due to limitations related to slice thickness and the degree of motion artefact.¹ A study reported that CT scan of the chest only identified foreign body in 35% of patients under age of 65 and 21% of patients above age of 65.⁵ Therefore, indirect radiographic abnormalities, such as atelectasis, are important.^{1 4 5}

In most cases, a diagnosis of FBA was made in a median of 10 days before bronchoscopy was performed.² However, the delay of diagnosis is not uncommon. Baharloo *et al* reported that the delay in diagnosis ranged from 3 hours to 11 months.⁴ Long-standing foreign body has been linked to bronchiectasis, recurrent pneumonia, necrotising pneumonia or pleural effusion.⁷ Our patient had remote history of aspiration and was

Figure 3 Portable chest X-ray 2 years before this admission.

diagnosed with empyema 8 years afterwards. Empyema is a rare presentation in patients with FBA. In a small cohort study, only one case of empyema was reported among 19 cases of aspiration.⁸ Furthermore, Weissberg and Refaely analysed the causes of empyema in 380 patients and found only one case related to FBA.⁹

Our patient underwent total parietal decortication and drainage of empyema. Pleural fluid culture revealed *S. paucimobilis*, an opportunistic pathogen. *S. paucimobilis* is yellow-pigmented, glucose-non-fermenting, Gram-negative aerobic bacillus found in soil and water.¹⁰ Malignancy, immunosuppressant use, diabetes and alcoholism have been associated with higher risk of *S. paucimobilis* infection.^{10 11} Even though it is a rare cause of healthcare-associated infections, *S. paucimobilis* has been reported in a variety of infections, such as bacteraemia, peritonitis, pneumonia, empyema, urinary tract infection, catheter-related infection, meningitis, brain abscess, osteomyelitis, endophthalmitis, bromhidrosis, splenic abscesses and biliary tract infection.^{10 12} After reviewing the case reports from 1979 to 2009, Ryan and Adley concluded that empyema comprised 2% of sporadic *S. paucimobilis* infections.¹² In our case, this patient did not have a history of malignancy, immunosuppressant use or alcoholism, but diabetes was present.

Figure 2 A CT scan of the chest, cross-section (A) and sagittal view (B).

Some studies suggest that hyperglycaemia affects the immune response in non-insulin-dependent diabetes mellitus patients.¹³ However, this patient's diabetes was well controlled by diet and his glycated haemoglobin was 6.7% at that time. He did have a remote history of tobacco exposure but stopped more than 15 years ago. He only had one episode of pneumonia 2 years before this hospitalisation and did not have any other infection which required hospitalisation or emergency room visit at least in last 10 years. Therefore, we do not think this patient was immunosuppressed.

The susceptibility of *S. paucimobilis* to β -lactam antibiotics varies, because the organism can produce β -lactamase.^{10 14 15} Based on case reports, the most active antimicrobial agents are fluoroquinolones, β -lactam/ β -lactamase combinations and carbapenems. Our patient was treated with ampicillin/sulbactam initially; after the pleural fluid culture revealed *S. paucimobilis*, we changed antibiotics to meropenem and then transitioned to a 30-day course of oral levofloxacin.

In conclusion, we present a case of *S. paucimobilis* empyema secondary to a remote aspiration event in an adult. A complete history is the key to identify a probable aspiration event that leads to further investigations. *S. paucimobilis* causes a variety of infections, and empyema is not common. The prognosis usually is promising due to its low virulence. Our patient was treated with meropenem and levofloxacin successfully.

Learning points

- In adults, foreign body aspiration can be asymptomatic, therefore, imaging may be helpful in asymptomatic patients with possible aspiration events.
- A chronic aspirated foreign body can promote empyema.
- *Sphingomonas paucimobilis* is an opportunistic gram-negative bacilli and can cause severe infection in non-immunocompromised individuals.
- *S. paucimobilis* is usually sensitive to fluoroquinolones, -lactam/ -lactamase combinations and carbapenems.

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