Case report

Pleural effusion as a rare presentation of foreign body aspiration

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ABSTRACT

Unsuspected, non-asphyxiating, aspirated foreign body often masquerades as unresolved pneumonia, bronchiolitis or bronchial asthma. We report herein an 82-year-old, male patient with pleural effusion. Although the patient received the diagnosis of heart failure and treatment with diuretics, the pleural effusion remained, and a productive cough and a low-grade fever developed. Thoracentesis showed an exudative effusion, and chest computed tomography revealed a pill-like object in the right bronchus intermedius. The foreign body proved to be an iron pill, and the patient finally died from obstructive pneumonia due to severe mucosal damage caused by the pill. The present case emphasizes that foreign body aspiration may mimic not only respiratory but also cardiovascular diseases and should be suspected if the treatment of the initially diagnosed condition fails to ameliorate the patient’s condition.

1. Introduction

Foreign body aspiration (FBA) is a serious and potentially life-threatening event. The mortality rate of FBA, the fourth most common cause of preventable deaths, was 1.6 deaths per 100,000 population in the United States in 2018 [1]. The rate increases in adults >75 years due to age-related slowing or impairment of swallowing often exacerbated by an underlying disease. Bronchial obstruction due to FBA can result in various complications, including atelectasis, recurrent pneumonia, lung abscess, and persistent bronchial stenosis. Although suffocation raises the suspicion of FBA, patients with non-asphyxiating FBA present with cough, dyspnea, and hemoptysis, and some patients are asymptomatic [2]. Most foreign bodies are radiolucent, and radiographic findings are typically nonspecific. Therefore, cases of non-asphyxiating FBA are often misdiagnosed as bronchial asthma, pneumonia or bronchiolitis unless a previous episode of aspiration can be established. We herein report a rare case of FBA presenting with a pleural effusion, leading to irreversible bronchial stenosis.

2. Case presentation

An 82-year-old, male patient was admitted with a productive cough of two weeks’ duration. His medical history included chronic atrial fibrillation, Sjögren’s syndrome with deficient saliva production, and mild iron-deficiency anemia, for which he received ferrous sulfate for one year. The patient received the diagnosis of heart failure at another hospital one month prior to his current presentation based on a right-sided pleural effusion on chest X-ray (Fig. 1A), pitting leg edema and his medical history. The edema resolved after treatment with diuretics for two weeks, but the patient newly had a low-grade fever and a productive cough. The fever resolved but the cough did not respond to treatment with cefcapene pivoxil.

On admission, the patient was afebrile, and his oxygen saturation was 95% on room air. Chest examination revealed wheeze in the right middle lung field and reduced breathing sounds in the right lower lung field. Chest X-ray showed decreased but persistent, right-sided pleural effusion and an infiltration shadow in the right lower lung field (Fig. 1B). Blood analysis demonstrated a normal white blood cell count (5000/mm³), elevated C-reactive protein (6.63 mg/dL), and elevated N-terminal pro-B-type natriuretic peptide (NT-proBNP; 1577 pg/mL). Thoracentesis revealed a slight exudative effusion (fluid protein 3.8 g/dL; serum protein 7.5 g/dL; fluid lactate dehydrogenase 118 U/L; and serum lactate dehydrogenase 244 U/L). Gram staining and cytology of the fluid using Papanicolaou stain were negative and class II, respectively. Chest
computed tomography visualized an isodense lesion in the right bronchus intermedius, right-sided pleural effusion, atelectasis in the middle lobes, and a peribronchovascular shadow in the lower lobes (Fig. 1C and D). Although the patient failed to recall any episode of pill aspiration, bronchoscopy was performed to investigate the endobronchial lesion on suspicion of pill aspiration or a malignancy and revealed total obstruction of the right bronchus intermedius by a foreign body with an elliptical shape (Fig. 2A). The object was removed with grasping forceps. The endobronchial mucosa was golden-yellow in color, necrotic, and edematous with marked contact bleeding (Fig. 2B). The pill-like object stained positively for iron. Toilet bronchoscopy was performed to remove a significant quantity of necrotic debris and purulent sputum once a week over four weeks in addition to antibiotic and short-term corticosteroid therapy. Consequently, the patient’s symptoms and mucosal appearance gradually improved. However, the bronchial stenosis persisted despite repeated balloon dilation (Fig. 2C), and the patient finally died of severe obstructive pneumonia two years later.

3. Discussion

Nonspecific respiratory symptoms and chest X-ray findings in patients with pill aspiration can delay diagnosis. Furthermore, pleural effusion as the chief presentation is rare, and the present case was initially diagnosed on the basis of the atypical radiological findings and the patient’s history of atrial fibrillation.

Presumably, both heart failure and post-obstructive pneumonia influenced the development of the pleural effusion of this case. Elevation of NT-proBNP and the normal position of the trachea on one month before admission imply pleural effusion resulting from heart failure, while the obstruction of the right bronchus intermedius by the pill suggests a pleural effusion caused by post-obstructive pneumonia. Pleural effusions due to heart failure are usually bilateral (72.5%), but may be right (15%) or left (12.5%) sided [3]. Although it is believed that congestive heart failure usually causes transudative effusions, Peterman et al. [4] reported that 33% of the pleural fluids in patients with congestive heart failure showed exudative effusions according to the criteria of Light et al. [5]. Moreover, diuresis for treatment of heart failure can convert a transudative effusion into an exudative one [6]. Therefore, the slight exudative effusion in our case might also imply that the pleural fluid was caused by heart failure.

On the other hand, there are a few reports of pleural effusion due to FBA as the chief presentation, with only three adults cases [7-9] and two pediatric cases [10,11] being reported. One case [9] was of empyema, and the cultures in four cases [7,8,10,11] were sterile. However, antibiotics were administered before thoracentesis in three of the latter four cases, which had similarities with the present case. Therefore, prior antibiotic therapy might have influenced the pleural fluid analysis results. Pneumonia [7-9] and an occlusive foreign body [7,8,10] were confirmed in at least three cases. Based on these past reports and the findings of the present case, physicians should be aware that FBA frequently causes post-obstructive pneumonia, and that pleural effusion secondary to pneumonia can occur concomitantly as a rare complication of FBA.

Iron pills are widely prescribed for the prevention and treatment of iron deficiency anemia. Excessive mucosal contact with iron tablets induces mucosal damage in the upper gastrointestinal tract presumably through the toxic effects of iron oxidation [12]. Iron tablet aspiration into the respiratory tract is uncommon but can induce a severe and potentially fatal chemical injury [13]. Bronchoscopy reveals a golden-yellow, hemorrhagic, necrotic mucosa in the acute phase while...
bronchial stenosis is a common complication in the chronic phase [13]. In light of past reports, the amount of free radicals generated by iron oxidation and the duration from the aspiration of an iron pill to its removal apparently affect the severity of airway injury. Therefore, early suspicion of iron pill aspiration and immediate removal are necessary to minimize the damage. In our case, delay in diagnosis until removal of the iron pill led to irreversible bronchial stenosis.

4. Conclusion

In conclusion, physicians should bear in mind that FBA may mimic not only respiratory but also cardiovascular diseases and suspect non-asphyxiating FBA in patients with an initial diagnosis of these conditions if they fail to respond to the corresponding treatments or show deterioration.

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Authors’ contributions

SO: study design, collecting data, data analysis, and manuscript writing. MK: study design and editorial supervision. MY: collecting data. KM: writing-review and editing. AW: writing-review and editing. All the authors have read and approved the final manuscript.

Declaration of competing interest

The authors declare that they have no conflicts of interest.

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