Bronchoscopic and histological changes over time following acute ferrous sulphate tablet aspiration

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SUMMARY

An 84-year-old woman accidentally aspirated an iron tablet. She was successfully treated with early endobronchial removal of the iron tablet remnants, oral corticosteroids and antibiotics. We describe the bronchoscopic and histological changes over time following acute iron tablet aspiration and highlight the importance of early intervention to avoid complications.

CASE PRESENTATION

An 84-year-old woman presented to the emergency department 4 h after accidentally aspirating an iron tablet. She experienced acute onset choking, coughing up brown sputum and a burning sensation in her chest. The patient was taking iron tablets (ferrous sulphate, 200 mg thrice daily) for iron deficiency anaemia. On examination, she had no fever. Oxygen saturation was 97% on air. There were polyphonic wheezes in the left lung.

A chest radiograph was normal. Laboratory investigations revealed a plasma total white cell count of $15.8 (4-11 \times 10^9/l)$, neutrophil count $13.6 (3-8 \times 10^9/l)$ and a C reactive protein level of $73.1 (<5 \text{ mg/l})$. A fiberoptic bronchoscopy revealed inflammation of the mucosa of the lingula and proximal part of left upper lobe bronchus (LULB), along with brown tablet remnants which were removed with forceps (figure 1). A 7-day course of oral corticosteroid 30 mg daily, co-amoxiclav 625 mg thrice daily and metronidazole 400 mg thrice daily was started to reduce airway inflammation and as prophylactic treatment of aspiration pneumonia. She remained well and discharged home 3 days later. The histopathological examination of the bronchial biopsies revealed fragments of degenerative inflammatory material, fibrin, connective tissue encrusted with brown pigment and birefringent foreign material. The appearance was consistent with the clinical history of aspirated foreign material.

For further assessment, a repeat bronchoscopy was performed 10 days later. It showed brown necrotic material with friable mucosa in the lingula and proximal part of the LULB. The endobronchial mucosal biopsies revealed that the surface epithelium was replaced with metaplastic squamous cells, infiltration by neutrophils and deposition of haemosiderin pigments consistent with iron. The haemosiderin pigments were also encrusted on the connective tissue and elastic fibres. There was mild nuclear atypia within the mucous glands. A CT of the thorax with contrast showed no abnormality.

Subsequent bronchoscopies showed reduced bronchial mucosal inflammation, scab formation and granulation tissue 2 months later. Minimal

patchy scarring and brown discolouration of the mucosa of the lingula and proximal LULB were found 6 months later (figures 2 and 3). To date, the patient remains well and asymptomatic.

DISCUSSION

Iron tablet aspiration is rare but with potential detrimental consequences.¹⁻³ Delay in diagnosis and treatment may lead to bronchial stenosis,¹ bronchial wall erosion,² massive haemoptysis and death.³ It has been proposed that iron pill aspiration can be diagnosed by a triad of aspiration, intense airway inflammation and iron particles on biopsy, even in the absence of an iron tablet which

Figure 1 (A and B) Fiberoptic bronchoscopy at presentation. There was marked inflammation starting from the left main bronchus extending into the left upper lobe, with yellow tablet remnants seen on top of the mucosa, some of which were removed by forceps.

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Figure 2 Fiberoptic bronchoscopy at 2 months. At 2 months there was reduced bronchial mucosal inflammation, with scab formation and granulation tissue.

often disintegrates in the airway before bronchoscopy.⁴ Our case confirms previous findings that iron tablet aspiration leads to significant airway inflammation with the development of a granulation tissue.

The early bronchoscopic appearances following iron tablet aspiration are distinctive and allow early recognition (figure 4). Kim *et al*⁵ described grossly inflamed golden-yellow bronchial mucosa with ulceration and sloughing in three patients with iron tablet aspiration. In another case, atypical squamous cells were found in bronchial washings and squamous metaplasia found on bronchial mucosal biopsy.⁶ In our case, the surface epithelium of the bronchial mucosa was replaced by metaplastic squamous cells, which were most likely due to the bronchial mucosal reaction to the iron tablet as opposed to squamous

Figure 3 Fiberoptic bronchoscopy at 6 months. There was minimal patchy scarring and brown discolouration of the mucosa of the lingula and proximal left upper lobe.

Figure 4 Histopathological examination at presentation. Initial biopsies showed fragments of degenerative inflammatory material, fibrin, connective tissue encrusted with brown pigment and birefringent foreign material. This was consistent with the clinical history of iron pill aspiration.

neoplasia. The exclusion of neoplasm was further confirmed with CT scanning of the thorax.

The early histological appearances following iron tablet aspiration are acute mucosal damage, widespread iron precipitation and squamous metaplasia over areas of ulceration with the development of scarring and granulation tissue several months later.² This explains that bronchial stenosis occurs as a late complication that may require balloon bronchoplasty and surgery.^{1 4} The gradual bronchial stenosis can occur despite removal of the iron tablet fragments.⁷ Early bronchoscopy is important to establish the damage due to iron-induced necrosis, ulceration of the bronchus, pulmonary arteries and veins. This is highlighted through the death of a patient with massive haemoptysis 4 days after aspirating an iron tablet.³

In our case, reduced bronchial mucosal inflammation, scab formation and granulation tissue were found 2 months later and only minimal patchy scarring of the mucosa 6 months later (figures 5 and 6). We believe that the detrimental effects of iron

Figure 5 Histopathological examination at 10 days. Biopsies taken at 10 days showed acanthotic surface epithelium with nuclear enlargement and infiltration by neutrophils. Golden brown pigment consistent with iron was encrusted on the connective tissue and elastic fibres. Metaplastic squamous cells replaced the surface epithelium in places, most likely due to the bronchial mucosal reaction.

Figure 6 Histopathological examination at 6 months. Biopsies taken after 2 months showed granulation tissue and strips of stratified squamous epithelium with reactive changes and inflammation. Degenerative eosinophilic material containing abundant haemosiderin pigment encrusted on connective tissue fibres was also present. There was no evidence of dysplasia or malignancy.

tablet aspiration may have been averted by using oral corticosteroids to reduce the bronchial mucosa inflammation, antibiotics to prevent infection and removal of the remnants of iron tablet within 24 h of aspiration.

Although rare, physicians need to be aware of the complications and need for prompt management following iron tablet aspiration. The bronchoscopic and histological changes described here may give useful pointers in cases when a history of aspiration is less clear. We found that early bronchoscopy to remove the tablet fragments in addition to supportive measures

including antibiotics and oral corticosteroids proved successful in the management of our patient who remains well to date.

Learning points

- ▶ Iron tablet aspiration is rare but with potential detrimental consequences including bronchial stenosis, bronchial wall erosion, massive haemoptysis and death.
- ▶ Early intervention including bronchoscopy to remove the tablet fragments in addition to supportive measures is important to help avoid such complications.
- ▶ The bronchoscopic and histological changes described here may give useful pointers in cases when a history of aspiration is less clear.

Competing interests None.

Patient consent Obtained.

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