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Case report

Syndrome of iron pill inhalation in four patients with accidental tablet aspiration: Severe airway complications are described

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A B S T R A C T

Iron pill inhalation represents a uncommon cause of syntomatic endobronchial foreign bodies. Unlike foreign body, the direct contact of iron tablet onto the bronchial mucosa results in severe bronchial damage in addition to obstruction and local irritation. Four patients with Iron Pill Inhalation Syndrome are described. All but one patient developed irreversible bronchial stenosis as late post inflammatory complication. Bronchoscopic features and clinical evolution are described in order to reduce the risk of severe side-effects in patients highly suspected for iron pill aspiration.

Introduction

In patients with swallowing disorders and history of martial therapy, the onset of cough, dyspnoea and recurrent pneumonias are mandatory indication for bronchoscopic examination [1–7].

Accidental iron pill-inhalation represents an acute broncho-logical emergency due to severe chemical injury to tracheobronchial mucosa [1]. Nonspecific respiratory symptoms make a careful history essential for the diagnosis [1,2]. Unlike most foreign bodies, the iron pill quickly disintegrates in the airway, inducing deep mucosal necrosis which is responsible for severe early and late complications if immediate removal is not performed [5].

In this paper we present the bronchoscopic features and clinical history of four patients with iron pill inhalation with the aim of facilitating its early diagnosis by potentially severe complications.

Case1

A 36 year old woman at 8 months gestation was admitted to emergency room because of heavy cough, dyspnoea and chest discomfort after accidental iron pill inhalation. She was taking ferrous sulphate daily. No alteration of larynx was observed at laryngoscopy and the patient was discharged. One week later she expectorated an intact iron tablet with cough, whilst respiratory symptoms were still present. After childbirth, she was diagnosed of asthma. While the chest X-ray was normal, spirometry revealed obstruction of the small and moderate airways. Despite steroid treatment, the symptoms continued for months and the patient was addressed to our endoscopy unit for further evaluation. She underwent a chest HRCT scan revealing a pulmonary consolidation of right lower lobe and partial right middle lobe atelectasis. (Fig 1) At fibreoptic bronchoscopy, funnel-shaped severe stenosis of the lumen of the bronchus intermedius was observed. A dilatation with rigid scope was performed and a bronchial Dumon silicon stent was placed into bronchus intermedius. Unfortunately, re-expansion of the middle and lower lobe was not achieved so the patient subsequently underwent bilobectomy of the right middle and lower lobe. Hystologic findings of the removed lung showed lymphoplasmacytic infiltrate, large amounts of haemosiderin-laden macrophages and multiple giant cells of the foreign body type with positive lamellar material by iron stain. In addition pulmonary consolidation with follicular bronchiolitis were also seen.

Case 2

A 40 year old woman with martial anemia developed heavy cough, chest discomfort and dyspnoea. There was no history of respiratory disease at time of iron-pill inhalation. Ulcerated and extensive fibrinoid necrosis of the bronchus intermedius and right lower bronchus wall were observed at bronchoscopy. No improvement was observed despite antibiotic and steroid therapy. A second bronchoscopy was performed after one month and showed a cicatricial stenosis of the bronchus intermedius. Laser therapy and bronchial dilatation with bougies via rigid scope were

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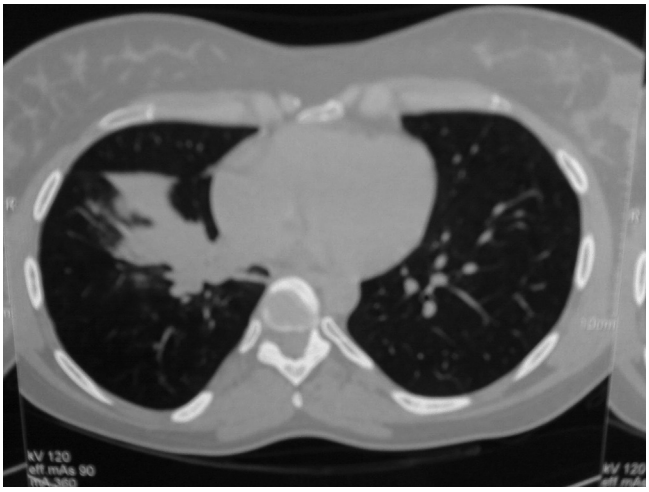

Fig. 1. Chest CT scan showing peri-hilar localized pulmonary consolidation associated to partial right middle lobe collapse.

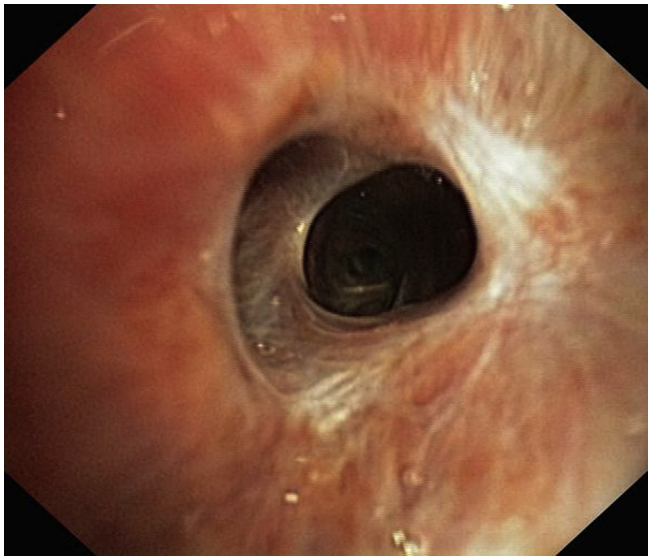

Fig. 2. Thin layer membranous cicatricial stenosis of the bronchus intermedius: the middle lobar and the lower lobar bronchus are patent.

performed and a bronchial caliber of 9 mm was achieved. At bronchoscopic follow-up no recurrence of the stenosis was observed and the patient had significant relief of symptoms.

Case 3

A 70 year-old man underwent urgent rigid bronchoscopy because of accidental iron pill inhalation into main right bronchus. The foreign body, in absence of flogosis and oedema of the mucosa, was removed tree hour later. One week later a second bronchoscopy showed localized irregular area of yellow pigmentation of the mucosa. Steroid therapy with slow withdrawal modality was given. After three months, a control bronchoscopy revealed persistent localized yellow-tatoo area of the mucosa in absence of severe complications.

Case 4

A 55 year old woman was referred to our bronchoscopy unit for persistent dry cough, stridor and shortness of breath. At fibreoptic bronchoscopy circumferential granuloma and black fragments totally occluding the bronchial intermedius lumen were found. The iron pill was removed by means of a rigid foreign body-forceps and a laser–assisted mechanical dilatation restored airway patency of the bronchus intermedius. In spite of the steroid therapy the patient developed ulcerative necrosis of bronchial mucosa complicated by the relapse of the bronchial stenosis. One month later a second laser photo-resection and mechanical dilatation was necessary to restore a 7 mm bronchial caliber. Follow-up fiber-bronchoscopy after one year showed a minor cicatricial diaphragm at distal end of the bronchus intermedius without significant bronchial stenosis (Fig 2).

Discussion

Foreign–body inhalation represents a potentially fatal respiratory emergency, which occurs more frequently in children [2,3]. The diagnosis of foreign body inhalation can be missed in adults with subacute or chronic respiratory symptoms unless a clear history of aspiration can be referred [2,3,9]. Iron tablet aspiration is an uncommon cause of acute and persistent bronchial inflammation that may evolve toward recurrent bronchial stenosis if misdiagnose [1–9]. Neurological disorders, sedative or alcohol use are predisposing factors to aspiration in the elderly. An uncorrect diagnosis of asthma or chronic pneumonia can be performed and occult foreign bodies can be undetected for years [4–7]. The pathogenesis of iron tablet damage is secondary to hydroxyl radical formation and lipid peroxidation of ferrous ions in ferric form. In presence of acidic PH value the protective action of the apoproteins is diminished and more iron is available to promote hydroxyl radical caustic chemical burns of the bronchial mucosa [6,7]. The severity of airway damage depends on the amount of active iron and on the intensity of contact with bronchial mucosa.

A short contact results in local irritation. More prolonged contact results in acute bronchial and pulmonary vessels ulceration. A vascular lesion may cause lethal hemorrhage. Subacute inflammation induces late sequelae as granuloma, bronchial stenosis, bronchiectasis and pulmonary atelectasis which may develop even months after the aspiration. According to the literature, the bronchus intermedius is the most frequent site of location [4,5,9]. The damage resulting from the iron tablet aspiration largely depends on the length of contact with the airway mucosa and this likely explains the different bronchoscopic findings of the 4 cases presented in this paper.

The endoscopic pattern ranged from simple tattooing in shorter stay, to recurrent bronchial stenosis and irreversible parenchimal damage. The different evolution of the disease is related to iron pill melting and to the intensity of caustic chemical burns. In order to reduce the damage an early removal is essential. In patient with the suspect of previous iron–pill inhalation and normal CXR, the bronchoscopy can result essential to confirm the diagnosis and evaluate late complications even months after the disintegration of the tablet [2,3,9]. At bronchoscopy, bronchial inflammation and intense positivity to Perl's stain of biopsies of bronchial wall is observed [1,5–7].

Interventional bronchoscopy was effective in restoring airway patency in two of three patients while in the third patient a pulmonary bilobectomy was necessary although the placement of a Dumon stent was placed in the bronchus intermedius.

Steroid therapy was administered in all four patients to reduce fibroblast proliferation. In patient with ulceration and necrosis of bronchial mucosa, steroid therapy was not effective in preventing recurrent bronchial stenosis [1–4].

No predisposing factors to inhalation were observed in our patients. Iron pill inhalation remains a severe and potentially fatal airway disease that requires an immediate bronchoscopic diagnosis. Operative bronchoscopy is the treatment of choice in presence of bronchial stenosis.

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