

TECHNICAL INNOVATIONS

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A new method for removal of metallic-ferromagnetic foreign bodies from the tracheobronchial tree

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Abstract Foreign-body (FB) aspirations account for a reasonable percentage of respiratory emergencies in young children. Whereas 67% of aspirated FBs are of organic origin, metallic-ferromagnetic FBs are observed less frequently. We report the use of a wire with a magnetic tip fitting into the working channel of a rigid bronchoscope for removal of ferromagnetic FBs from the tracheobronchial tree.

Key words Bronchoscopy · Metallic foreign body · Magnetic · Aspiration · Child

Introduction

Of all aspirated foreign bodies (FB) in children, 67% are of organic origin (peanuts, melon seeds), whereas the percentage of metallic FBs is rather low [1, 3, 8]. A majority of the afflicted children are aged between 8 and 30 months [10]. Most of the aspirated FBs are lodged in the right bronchial system. The state-of-the-art method of FB removal is rigid bronchoscopy. Extraction is usually performed using grasping forceps, a Fogarty catheter, or a Dormia basket [2, 5, 7]. We report a technical

innovation for removal of aspirated metallic-ferromagnetic FBs using a rigid bronchoscope equipped with a probe bearing a magnetic tip.

Case report

A previously healthy 3-year-old developed persistent coughing and fever 2 weeks before admission to our clinic. During this period of subtle symptoms, treatment was mistakenly directed toward a pneumonic infection. Upon admission, the physical examination revealed a febrile infant in reduced general condition. Chest percussion disclosed hyperresonance over the right upper lobe, whereas auscultation demonstrated diminished breath sounds over the right lung and wheezing at the left base. A chest X-ray film revealed a radiopaque, 6–7 mm metal screw located in the right main bronchus with hyperinflation of the right upper lobe (air trapping), atelectatic areas in the right middle and lower lobes, and minimal mediastinal shift to the left (Fig. 1). Red and white blood cell counts were within normal ranges.

Rigid bronchoscopy with a 4-mm ventilating bronchoscope was performed the same day using a new technique, introducing a flexible wire with a magnetic tip into the bronchoscope (Fig. 2). Under direct vision, the magnetic tip and subsequently the bronchoscope were inserted into the right main bronchus. After insertion of the instrument, the screw was immediately attracted to the magnetic tip of the probe and could easily be removed. Massive amounts of pus were evacuated from the right bronchial system and secretions were suctioned. Subsequent control bronchoscopy using a flexible bronchoscope was performed via an endotracheal tube. Four days after the first intervention, control bronchoscopy revealed only minimal viscous secretions within the bronchial system. Postoperative antibiotic treatment was ad-

ministered (amoxicillin) and micronephrine inhalation, bronchodilators (salbutamol), and chest physical therapy were applied. The child's condition improved quickly. At follow-up 3 months later the boy was free of respiratory symptoms.

Discussion

The suspected or actual presence of a FB in the airway is one of the most frequently occurring emergencies in children aged between 10 and 30 months [4, 10]. Laryngotracheal FBs can be immediately life-threatening, whereas bronchial FBs usually cause initial acute distress that is

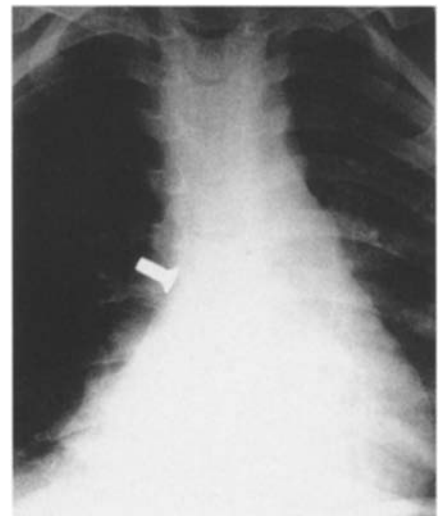


Fig. 1 Radiopaque metal screw projecting to right main bronchus with hyperinflation of right upper lobe, atelectatic areas in right middle and lower lobes, and minimal mediastinal shift to left

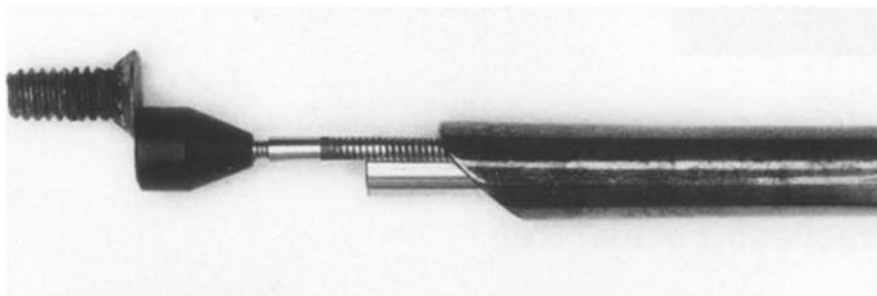


Fig. 2 Magnetic tip screwed onto flexible wire introduced into working channel of rigid bronchoscope

sometimes followed by an interval with fewer symptoms [1, 6]. It must be stressed that a chest radiograph can be normal following non-radiopaque FB aspiration in a child [3, 10, 13]. Whenever there is a suspicion of aspiration, this remains a strict indication for bronchoscopy [9, 11, 12]. The state-of-the-art method is rigid bronchoscopy, which provides a ventilating side-port and a working channel. Through the working channel, a variety of instruments can be inserted such as a grasping forceps, a Fogarty catheter, or a Dormia basket [5].

Our innovation was to introduce a flexible wire with a magnetic tip into the rigid bronchoscope to allow easier removal of ferromagnetic objects. The device we used is commercially available for use in gastroscopes. The magnetic tip can be unscrewed from the wire for in-

sertion of the wire into the working channel of the pediatric bronchoscope; the tip is then screwed on before insertion of the bronchoscope. The magnetic tip can be guided under direct bronchoscopic vision, thus facilitating quick and safe magnetic FB extraction.

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