Right lower lobectomy following inhalation of a toy traffic cone

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Undetected aspirated foreign bodies can become a therapeutic challenge resulting in unresolved pneumonia and bronchiectasis and eventual lobectomy.

DECLARATIONS

Competing Interests

None declared

Funding

None declared

Ethical Approval

Written informed consent to publication was obtained from the patient.

Guarantor

SL

Contributorship

SL and EP composed the manuscript. FC and TY and HR revised it. WW provided structural advice

Acknowledgements

The authors wish to thank NHS Lothian for their support

Introduction

Obstruction of the tracheobronchial tree frequently occurs in children due to a lack of adequate dentition and immature swallowing coordination.[1,2] This contrasts obstruction in adults which is caused by a failure of airway protection mechanisms due to neurological disorders and trauma.[1] Obstruction has three clinical stages: choking and shortness of breath, an asymptomatic phase then a complication stage.[2] The composition of the foreign matter determines the stage. Organic materials cause a severe mucosal inflammatory reaction and granulation tissue may develop over several hours. This causes subsequent swelling and partial obstruction warranting immediate clinical intervention. In contrast, inorganic materials can remain asymptomatic for longer periods of time unless the distal airways are compromised. This presents a therapeutic challenge even though two-thirds of objects lodge in main stem bronchi rather than distal bronchi.[1,2] Complications of undetected foreign bodies include unresolved pneumonia and abscess formation, fibrosis and bronchiectasis.[1] Our case is of a long forgotten toy traffic cone aspirated during childhood that remained undetected for 40 years.

Case report

A 46-year-old man presented in early 2012 having a 16-year history of recurrent respiratory tract infections. He had originally presented to the respiratory physicians in 1996, and in 2004, he developed an empyema which required thoracotomy and drainage. Following drainage, he remained relatively well requiring infrequent oral antibiotics for exacerbations of bronchiectasis on a background of repeated episodes of right basal pneumonia. A sputum specimen from the patient cultured positive for *Haemophilus influenzae*. A high-resolution computed tomography scan (HRCT) in 2004 demonstrated bronchiectasis and this was confirmed on repeat imaging eight years later. His background history included right lower lobe childhood bronchiectasis diagnosed after an episode of haemoptysis. A further HRCT scan demonstrated an area of high attenuation in the right lower lobe bronchus intermedius (Figure 1a and b). This was intra-luminal and solid in keeping with appearances of a foreign body or simply a calcified secretion: it looked like a toy traffic cone.

On enquiry, the patient recalled swallowing a toy traffic cone over 40 years ago when he was six years old. He had choked at the time but assumed it had been swallowed. Ongoing respiratory review resulted in a referral to our thoracic department for surgical assessment. A rigid bronchoscopy showed the right lower lobe bronchus was narrowed to a tiny orifice continually discharging pus. The bronchus intermedius was short and the middle lobe was inflamed. The right main bronchus and upper lobe were both normal as was the apical segment of the right lower lobe.

Further surgical management included a flexible bronchoscopy under general anaesthetic to assess the bronchus to the lower lobe. Due to the protracted clinical history, it was doubtful that extraction would be possible and the patient

Provenance
This article was submitted by the authors and peer reviewed by Muhammad Khan

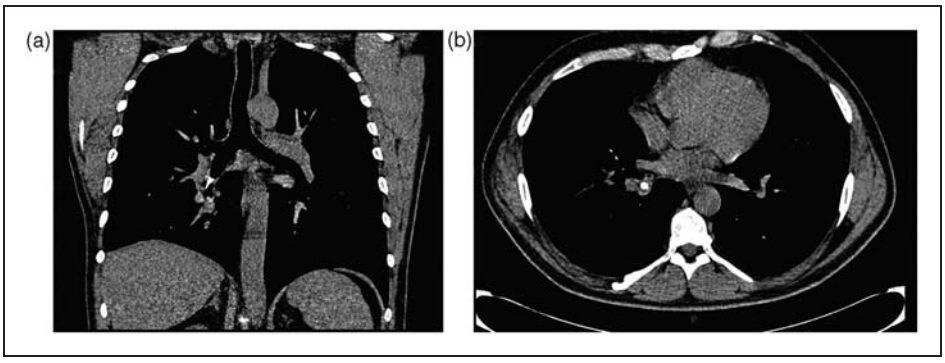

Figure 1. (a) HRCT (coronal) six months before the operation showing the traffic cone occluding the right bronchus intermedius. (b) HRCT (axial) six months before the operation showing the traffic cone occluding the right bronchus intermedius.

was scheduled for an elective thoracotomy. Preoperative investigations included a chest X-ray which demonstrated obliteration of the right costodiaphragmatic angle and normal pulmonary function tests (Figure 2). At operation, a bronchoscopy revealed an indurated area at the bifurcation of the middle lobe and right lower lobe bronchi. This area still discharged pus and bronchial lavage and suctioning revealed a yellow foreign body which was extraluminal. The surgical team proceeded to perform a right lower lobectomy and wedge excision of the middle lobe.

Intraoperatively, multiple inflammatory adhesions were discovered. The right inferior pulmonary vein and right pulmonary artery were both identified and divided. The right apical segmental artery and right basilar artery were also identified and divided enabling the posterior hilar artery to be visualized and the bronchus exposed. During dissection of the bronchus, profuse quantities of pus were aspirated (Figure 3a). The toy traffic cone was identified in the same location as that determined on CT (Figure 3b). Once removed, the right lower lobe bronchus was stapled and oversewn using a 3-0 Vicryl suture. A small section of the middle lobe was excised after dividing the inferior segmental bronchus of the middle lobe.

There were no postoperative complications reported and a short course of intravenous antibiotics was given. Histopathological examination revealed a significantly underdeveloped right lower lobe having areas of focal consolidation and changes consistent with bronchiectasis. The right lower lobe bronchi had diffuse dilatation and associated peribronchial fibrosis and scarring. The toy traffic cone was returned to the patient (Figure 4).

Figure 2. Chest X-ray taken preoperatively showing an obliterated right costodiaphragmatic angle.

Discussion

Occlusion of a lobar bronchus is usually manifested by a cough and chest pain necessitating

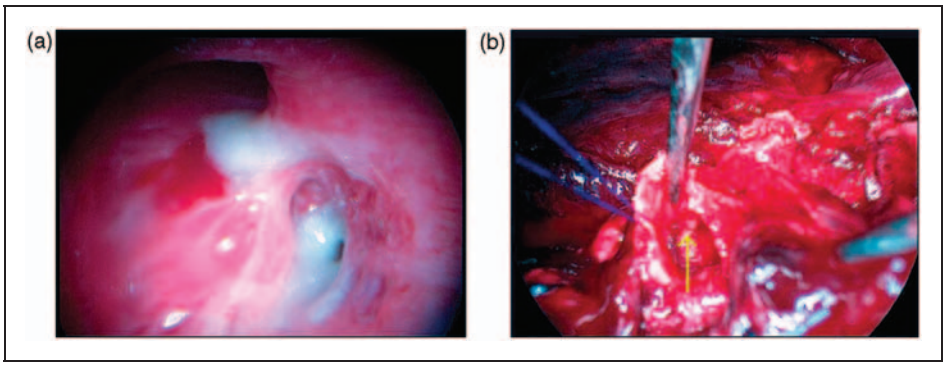

Figure 3. (a) Bronchoscopic image of the right lower lobe and middle lobe bronchus showing profuse exudation of pus. (b) Image taken at thoracotomy of the middle lobe bronchus showing the yellow traffic cone and friable tissue.

Figure 4. Image of the extracted toy traffic cone post operatively next to a specimen pot.

immediate medical and surgical intervention.[1–3] This predominantly exists in adults whose airways are more rigid and less distensible than children particularly if organic material is aspirated. The patient's lobar bronchus became progressively narrowed due to an obstruction that did not cause an acute clinical presentation at the time of aspiration. The interval between aspiration and diagnosis caused progressive deterioration of the patient's pulmonary function and recurrent chest infections.

Foreign bodies can obstruct the tracheobronchial tree by migrating from distant sites such as the oesophagus.[4] These can escape detection due to inconsistencies in the clinical history.[2] If the acute phase passes uneventfully, the child may progress to the second stage by being asymptomatic and develop chronic inflammatory changes and recurrent bouts of infection. This may progress to bronchiectasis and typically involves inorganic objects such as a toy traffic cone. The development of bronchiectasis is the third stage and often requires surgical management.

Bronchiectasis may undergo resolution if the foreign body is extracted at bronchoscopy.[1] Foreign bodies may be extracted using flexible bronchoscopy as this obviates the need for a thoracotomy and resultant lobectomy, which may lead to a reduction in pulmonary function. Kambayashi *et al*. highlight the fact that a long retained foreign body can be extremely difficult to extract due to increased airway granulation tissue. Their case highlighted an eight-year history as opposed to a 40-year delay in our case.[5] Therefore, if bronchoscopy fails to extract a foreign body and if the bronchiectasis is specific to a lobe, then surgical resection of that lobe is the definitive treatment.

Our case highlights several important considerations. First, even if the toy traffic cone had not been missed on previous imaging, the eventual lobectomy highlights the destructive potency of an inorganic foreign body which escaped detection for over 40 years. Second, this should serve as an aide memoir to consider the possibility of an inhaled foreign body where a clinical history of childhood bronchiectasis exists.

Conclusion

This case demonstrates the destructive potency of an inorganic foreign body that escaped detection for over 40 years. It highlights the need for consideration of aspirated matter in the clinical history of bronchiectasis diagnosed in childhood. This requires thorough history and a high index of clinical suspicion.

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