

A Pediatric Case of Retrieving Fragile Foreign Body Bronchus – Chest Percussions and Saline Lavage in Rescue of Bronchoscopy with Lung Isolation

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ABSTRACT

Foreign body (FB) aspiration is a leading cause of morbidity and mortality among young children. Many anaesthetic problems exist in children with aspirated foreign bodies, owing to the fragile paediatric cardiopulmonary status and the small paediatric airway being shared for both anaesthesia and bronchoscopy. A 4-year-old, 15 kg male child presented with history of almond aspiration. Rigid bronchoscopy revealed the foreign body occluding left main bronchus, and with the multiple attempts, which was broken into several pieces. Flexible bronchoscope could also not able to assess the fragments. Hence, chest percussions in lateral posture and bronchial lavage were done to suction out all the pieces of almond. With failure of the conventional bronchoscopic procedure, innovative approaches shall be adopted so as to save a life. We had such a case of FB aspiration, where due to fragile nature of the FB leading to multiple fragments. We managed this case by lung isolation using infant feeding tube and using chest percussions and saline lavage for the rescue intervention.

Keywords: Pediatric Foreign Body; Failed Bronchoscopy; Chest Physiotherapy; Bronchial Lavage.

INTRODUCTION

Foreign body (FB) aspiration is a leading cause of morbidity and mortality among young children.¹ Peanuts, seeds, coins, battery cells and small toy parts are the commonly aspirated objects. Asphyxiation, complete airway obstruction and death can occur in case of entrapment at the proximal locations. The descending order of incidence for the location of aspirated FBs is in the right main bronchus, followed by the right lobar bronchi, left bronchi, trachea/carina, larynx respectively.² Several anaesthetic challenges and risks exist in children with aspirated foreign bodies, owing to their fragile cardiopulmonary status and relatively smaller airway being shared for both the anaesthesia and bronchoscopy.

CASE REPORT

A 4-year-old, 15 kg male child, was admitted in the emergency department with a history of almond aspiration with respiratory distress for last three days. He was shifted to the emergency operating room (OR) without any delay. All the standard multipara monitors were attached and baseline parameters were recorded, as pulse rate (PR) -134/min, blood pressure (BP) - 90/60 mmHg and room air oxygen saturation (SpO₂) -97%. On examination, stridor with bilateral rhonchi were audible on chest auscultation and other systemic

examination were within normal limits. General anaesthesia was induced with injection Glycopyrrolate (10 mcg/kg), injection Propofol (2 mg/kg) and injection Succinylcholine (1.5 mg/kg) intravenous (IV) after pre-oxygenation with 100% oxygen for 5 minutes, with an end-tidal oxygen 92%. Injection Hydrocortisone (4mg/kg) was administered and the patient was handed over for surgical intervention. The surgical team has tried to introduce a rigid bronchoscope, which was not successful, and the child started desaturating, along with he developed severe bradycardia (reaching SpO₂-70% and PR- 54/min). A loss of chest rises and ventilation in the left lung was observed. Instantly, the child was ventilated with bag mask ventilation till the improvement of saturation. Once the vitals become stable, subsequent bronchoscopy revealed the foreign body occluding left main bronchus. Assuming that, further manipulation may lead to spillage of the FB in the contralateral bronchus and complete airway obstruction, we introduced an infant feeding tube (size 8 Fr) into the right bronchus to secure airway and for probable use of suction, which fits snugly. All the multiple attempts had caused trauma and bleeding at the bronchial site and the almond was broken into pieces, that had advanced further. The decision was made to employ flexible bronchoscope, but the fragments could not be assessed. Then chest percussions in the right lateral position and bronchial lavage were done using saline to wash off the pieces of the almond and then suctioned out, with the aid of gravity. There was a visible improvement in chest rise on the left side, following the rescue procedure. No visible parts of the FB could be seen on check bronchoscopy. The decision was taken to abandon any further interventions. We reversed the child after

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achieving the necessary criteria. The child was shifted to the post-operative unit and later, transferred to the ward in a hemodynamically stable condition.

DISCUSSION

Inhaled FB is a major cause of death amongst children. In contrast to the inorganic foreign bodies, organic FB are more inducive to inflammatory reactions.³ Some organic foreign materials may swell due to fluid absorption after aspiration and the partial blockage can become total in time. Sharp tipped objects may perforate the airways.¹ Fragile paediatric cardiopulmonary status and limited functional residual capacity leads to reduced respiratory reserve, increased shunting and propensity for airway closure. During sub-optimal ventilation, all these factors along with the relatively raised oxygen consumption results into brisk hypoxemia. Bronchiectasis and drastic pulmonary changes may develop if the diagnosis is delayed.⁴ Rigid and flexible bronchoscope can be used to remove the inhaled foreign body. However, in the absence of or with the failure of the bronchoscopic procedure, innovative approaches are to be adopted so as to save a life. Though preservation of spontaneous respiration is ideal, muscle relaxation is sometimes required to prevent movement and allow easy passage of bronchoscope through the glottis. Total IV anaesthesia should be established soon after induction to provide uninterrupted anaesthesia during rigid bronchoscopy. Use of inhalational agents with preservation of spontaneous respiration is generally preferred because an already compromised airway necessitates an induction that maintains spontaneous ventilation to lower the risk of converting a partial proximal obstruction to complete as positive pressure ventilation may drive the FB further peripherally into potentially more precarious positions. If the FB gets displaced into contralateral mainstem bronchus while the originally involved bronchus is still obstructed by remaining FB or inflammation, it can result fatal. This makes it imperative to achieve lung isolation but owing to limited resources at hand at the given time, we used an infant feeding tube to achieve same. In such instances, chest physiotherapy can help to facilitate the clearing of the airways. This may include chest percussions and postural drainage. It effectively increases mucous clearance in many pulmonary conditions. Here, we were presented with a case of almond aspiration in which due to the fragile nature of FB, we had to use both rigid and flexible fiberoptic bronchoscope. Unfortunately, both of these methods were failed to remove FB completely. We then employed chest percussions with the patient in the right lateral position, attempting to dislodge the fragments with aid of gravity. After meticulous chest physiotherapy, we did bronchial lavage using saline and that was suctioned out through flexible fiberscope. Sayuti et al, have successfully dislodged a FB using chest percussion.⁵ Topical anaesthesia of the larynx and trachea with up to 3 mg/kg of lidocaine (2%–4%) is useful in preventing laryngospasm. Anticholinergics should be readily available as pronounced vagal stimulation during bronchoscopy and prolonged hypoxia may lead to cardiac arrest as we faced in

our case. The precordial stethoscope is useful in assessing respiratory effort and quality. Although rare, pneumothorax can be a complication and should be considered in case of rapid deterioration. Injection Hydrocortisone (1-5 mg/kg) or injection Dexamethasone (0.15-1 mg/kg) can be given prophylactically to reduce subglottic edema and other inflammatory changes. A chest radiograph should be ordered nearly six to eight hours after bronchoscopy in order to determine lung expansion and rule out remnant FB and pneumothorax. Any need of postoperative hospitalization depends on the clinical state of the patient.

CONCLUSION

In conclusion, alternative innovative approach of isolating lung with infant feeding tube, combining chest percussions and bronchial lavage with conventional bronchoscopy aided us in retrieving the tiny broken fragments of a fragile foreign body.

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