

# A large foreign body in the bronchus: Anaesthetic and Surgical Challenges

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## Abstract

**Purpose:** Sharing the airway with the surgeon and maintaining oxygenation during the removal of a large tracheal or bronchial foreign body (FB) can be challenging. We report the unusual extraction of a large foreign body and the anaesthetic challenges encountered during its removal.

**Clinical features:** A 9 month old baby presented to the emergency department with respiratory distress. X- ray chest revealed partial collapse of right lung with mediastinal shift and hyperinflation of left lung. The patient was taken to the operating room for emergency bronchoscopy. Bronchoscopy was done after inhalational induction with sevoflurane. The anaesthetic technique was spontaneous ventilation using isoflurane and intermittent doses of propofol. The surgeon was unable to extract the foreign body due to its large size. After multiple attempts and dislodgement of the FB to the opposite side with severe desaturation, a decision to do tracheotomy was made to extract the FB. The technique of anaesthesia involved changing over from spontaneous to controlled ventilation and endotracheal intubation for immediate management of desaturation. The FB was successfully removed through a tracheotomy with no further adverse events.

**Conclusion:** Complete cooperation and good communication between the surgeon and the anaesthesiologist is very important for the successful outcome of bronchoscopic procedures. When the surgeon has difficulty in extracting the foreign body, due to its large size they may have to resort to methods of removal other than through the oral cavity. Anaesthesiologist may have to alter one's planned technique and be ready to take quick measures in times of unexpected incidents.

## INTRODUCTION

With the introduction of bronchoscopes with attachment for breathing circuit, anaesthesia has become safer for bronchoscopic procedures in children. However these relatively safer techniques can become complicated any time during the procedure and anaesthesiologist has to be geared to take quick measures in times of unexpected incidents. We report the anaesthetic management for the removal of a large foreign body in the bronchus by an unusual method and its associated challenges.

## CASE REPORT

A 9 month old male baby weighing 6 kilogram, presented to the emergency department with a history of cough and breathing difficulty for 5 days and worsening of symptoms for the preceding 12 hours. On examination the baby was tachypneic and restless. He was found to have chest retraction, tracheal shift to the right and decreased air entry

on the right side of chest. Room air saturation was 87%. An urgent chest X- Ray was taken, which showed mediastinal shift to the right side with hyper inflation of the left side of the chest (fig.1). Foreign body aspiration of right bronchus was suspected. The child was taken to the operating room for emergency bronchoscopy.

**Figure 1**

Figure 1: x ray chest showing right lung collapse with mediastinal shift with hyperinflated left lung.



### **ANAESTHETIC TECHNIQUE**

The baby was anaesthetized using inhalational induction with oxygen and sevoflurane. Monitoring included ECG, SpO<sub>2</sub> and Noninvasive blood pressure (NiBP). SpO<sub>2</sub> improved to 96% with oxygen. An intravenous catheter was inserted in the hand. After achieving adequate depth, laryngoscopy was done and the vocal cords were sprayed with 20 mg of lignocaine (1ml of 2% lignocaine). A 5 mm rigid bronchoscope was introduced into the trachea when anesthesia seemed adequate. Maintenance of anaesthesia was achieved with O<sub>2</sub> and isoflurane (2%), which was delivered through the side port of the rigid bronchoscope using Jackson Rees modification of Ayre's T- piece. Intermittent boluses of propofol in 10 mg supplements were given if there was any sign of a light plane of anaesthesia.

Rigid bronchoscopy revealed a large custard apple seed blocking the right main bronchus. Because of the large size of the FB, removal through the bronchoscope was impossible. Grasping the FB with forceps, another attempt was made to remove the bronchoscope, forceps and foreign body together. This was also unsuccessful. Because the seed had swollen up, repeated attempts to remove it were unsuccessful. Each time, the grasped seed would slip at the subglottic level. The seed was grasped on its long axis and even this did not permit extraction. During the 4th attempt the seed slipped down, this time completely blocking air entry to the left lung (the normal side). There was a sudden desaturation to 50%. As the right side air entry was already compromised, saturation did not improve with ventilation via the bronchoscope. So the bronchoscope was removed

and the child was intubated with a 4.5 mm endotracheal tube (ETT) after giving succinylcholine. The saturation slowly improved to 95% with PEEP and suctioning. Now the right lung was found to expand well. Meanwhile arrangements were made for tracheotomy, as the size of the foreign body was found to be too large for removal through the conventional route. The ETT was taken out, the bronchoscope was reintroduced and ventilation continued through the side port. One more attempt was made to remove the foreign body with the patient paralyzed without success. Once a second surgeon got ready to do the tracheotomy and spontaneous respiration was reestablished, the second surgeon proceeded to do the tracheotomy. The tracheal rings were identified and stay sutures were taken on either side of tracheal ring. The seed was visualized using rigid bronchoscope in the left main bronchus and grasped with the forceps, after which both the scope and seed were pulled out in to the trachea and held just below the level of the tracheotomy. A longitudinal incision was made in the middle of stay sutures and the sutures were pulled apart to extract the seed. Under vision the bronchoscope was withdrawn till the FB was visualized and removed through the tracheal incision. A 4.5 mm tracheostomy tube was inserted with the child breathing spontaneously (Fig.2). The Oxygen saturation improved to 100% and the child was shifted to the ward when awake and comfortable. The child was decannulated on the sixth postoperative day and discharged on the 8th day.

**Figure 2**

Figure 2: X ray chest – post foreign body removal with tracheostomy tube in situ



## DISCUSSION

The technique of anesthesia for foreign body removal in children is influenced by the general condition of the patient, the preference and experience of the anaesthesiologist and the surgeon, and the type and location of the foreign body. A T-piece circuit is attached to the sidearm of the bronchoscope to allow delivery of oxygen and anaesthetic gases during the procedure. The presence of the telescope, with the viewing end occluded, results in a closed system, through which spontaneous or controlled ventilation may occur. There are advocates for both spontaneous and controlled ventilation. The system is open when the telescope is removed for suctioning and during introduction of the forceps for removal of FB interfering with controlled ventilation. However, with spontaneous ventilation, the resistance increases as the telescope occupies a significant proportion of the bronchoscope. It may be necessary to remove the telescope periodically to allow adequate breathing through the lumen of the bronchoscope when using smaller diameter bronchoscopes<sup>1</sup>.

We prefer to use spontaneous ventilation during anesthesia for bronchoscopy as it is less likely to dislodge the foreign body<sup>1,2,3,4</sup>. This also allows unhurried bronchoscopy. One of the disadvantages of spontaneous respiration is maintaining adequate depth of anesthesia. This can be overcome with increments of intravenous agents like propofol used judiciously maintaining spontaneous respiration.<sup>1,2</sup> We were able to keep adequate depth throughout the period of bronchoscopy with isoflurane and intermittent doses of propofol. The child tolerated repeated intubation and extubation of a 5 mm bronchoscope with this procedure. Though one is familiar with spontaneous respiration, one may need to switch over to muscle relaxation and controlled ventilation as in the case of a large foreign body especially if extraction is difficult at the level of the vocal cords.<sup>3,4</sup> We did consider paralyzing the baby but the difficulty of extraction was at the cricoid region.

A relatively safe technique can become complicated any time during bronchoscopy and an anesthetist has to be geared to take quick measures in times of unexpected incidents as happened during this procedure. The foreign body slipped from the forceps and blocked the left bronchus

which was oxygenating the patient till then, causing marked desaturation. At this point though it was possible to ventilate the child with the bronchoscope, air entry was inadequate and the compliance of the chest could not be assessed using bronchoscope. So an endotracheal tube was introduced. Oxygenation improved with PEEP and suctioning.

In the case of a large foreign body, removal may be possible through the scope if it is crushable. In this case though the seed had swollen up it was hard and non crushable. Hence the only alternative was to do a tracheotomy. There are only few reports of tracheostomy following bronchoscopy.<sup>5,6,7</sup> Resorting back to spontaneous ventilation allowed an unhurried tracheotomy and extraction of the FB through the tracheotomy. Because of repeated attempts of rigid bronchoscopy and possible cord edema, we decided to keep the tracheostomy patent at the end of procedure. After 6 days the child was decannulated and was discharged on the eighth day.

## CORRESPONDENCE TO

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