

Case Report

Thoracoscopic foreign body removal and repair of bronchus intermedius following injury during failed bronchoscopic retrieval

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ABSTRACT

Aspiration of foreign body (FB) into the airways is common in children and continues to be a cause for morbidity and mortality. We report herein, successful thoracoscopic management of a child who aspirated a large magnetic FB into his right bronchus and developed a tear of bronchus intermedius (BI) during an attempt at bronchoscopic retrieval using rigid bronchoscope. The impacted FB was successfully removed thoracoscopically followed by thoracoscopic BI repair.

KEY WORDS: Aspirated foreign body, bronchus repair, foreign body, thoracoscopy, video assisted thoracic surgery

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INTRODUCTION

Aspiration of foreign body (FB) into the airways is common in children and continues to be a cause for morbidity and mortality. It requires a prompt diagnosis and early treatment to reduce the potentially fatal consequences. Most are retrieved successfully by rigid or fiberoptic bronchoscope, though the latter is more reliable. Occasionally, in difficult foreign bodies, not only is retrieval unsuccessful, but also there may be an injury to the airway with its attendant complications. Such situations then require an emergency thoracotomy to salvage the situation and repair the airway. We report herein, successful thoracoscopic management of a child who aspirated a large magnetic FB into his right bronchus and developed a tear of bronchus intermedius (BI) during an attempt at bronchoscopic retrieval using rigid bronchoscope. The impacted FB was successfully removed thoracoscopically followed by thoracoscopic BI repair. To the best of our knowledge, it is the first such report from an Indian centre.

CASE REPORT

A 7-year-old, previously healthy boy, developed a severe cough with respiratory distress following accidental aspiration of an FB (piece of magnet) with which he was playing. He was initially treated with nebulization and oxygen therapy. Chest X-ray revealed a metallic FB in the right hilar area [Figure 1]. He was referred to a higher center for bronchoscopic removal of the FB, where he reported the next day and underwent rigid bronchoscopy under general anesthesia for removal of the FB. A large, bullet-shaped metallic FB was visualized in the BI. Attempts to grab it by any kind of forceps only pushed it distally. Several attempts to engage it in a dormia basket were also unsuccessful. After nearly 2 h of attempts at removal, the child was noticed to have developed subcutaneous emphysema in the neck which started progressing rapidly suggesting the possibility of airway injury. A tear could

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be seen in the BI which was partially traversed by the FB. The bronchoscopic procedure was abandoned, ventilation through the endotracheal tube was continued, and a 16F chest tube was inserted into the right chest. There was no fall in oxygen saturation, and he was hemodynamically stable. With a diagnosis of suspected BI injury, he was transferred to our hospital for surgical management.

At a presentation in our emergency department, the patient was on mechanical ventilation through an endotracheal tube with stable hemodynamic parameters. Subcutaneous emphysema was noted in the neck and upper chest. He had reduced air entry in the right lower zone. Consent for thoracoscopy/thoracotomy was taken from the parents, and the child was immediately taken up for thoracoscopy under general anesthesia. Single lung ventilation with collapse of the right lung was achieved by selective intubation of the left main bronchus under bronchoscopic guidance. The child was placed in left lateral position with 30° anterior tilt (semi-prone position). Three 5 mm ports were created: camera port in 7th intercostal space (ICS) posterior axillary line and two working ports with right one in 4th ICS slightly posterior to posterior axillary line and left one in 9th ICS in the vertical line from the tip of the scapula. A 5 mm high definition telescope was used for visualization through the camera port, and two atraumatic graspers were used for dissection.

On entering the right pleural cavity evidence of atelectatic collapse was seen in the right lower lobe with minimal fluid and formation of early fibrinous exudate over the lower lobe. The right upper lobe was not adequately collapsed because of being inflated by the leak from around the cuff of the endotracheal tube. At this point, the table was tilted anteriorly, and CO₂ insufflation at the pressure of 4 mm of Hg was used to enable us to see the posterior hilum adequately. The mediastinal pleura over the posterior hilum and the BI was intact and was seen bulging with ventilation suggesting leak from the airway. The lung was retracted anteriorly, and the posterior mediastinal pleura was opened. The BI was visualized. A 1 cm × 0.5 cm rent was noted in the BI through which the blackish FB was seen [Figure 2]. Although it was seen easily, multiple attempts to hold and remove it with an atraumatic laparoscopic instrument through the defect were not successful on account of the conical part of the body being tightly impacted distally. The FB was finally removed by pushing over the distal BI with an atraumatic bowel grasper and using a Maryland forceps in the other hand to overturn the FB and delivering it out of the bronchus. It was confirmed to be a magnetic object because it stuck to metallic instrument [Figure 2]. It was placed in a glove finger and taken out through one of the ports [Figure 3]. An endotracheal suction catheter was passed through one of the ports and guided into distal BI. Mucopurulent secretions were sucked out. Thereafter, the defect in the BI was closed with interrupted stitches using 3-0 polydioxanone suture by thoracoscopic intracorporeal suturing (three stitches). The cuff of the endotracheal tube in the left bronchus was now deflated to allow ventilation



Figure 1: Preoperative chest X-ray showing the aspirated foreign body

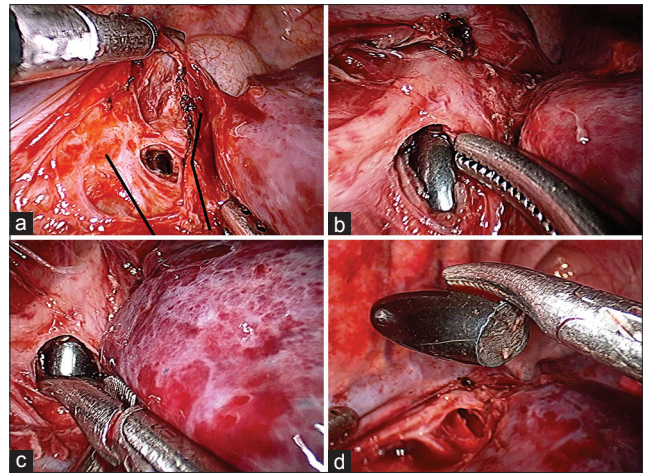


Figure 2: Thoracoscopic view of the procedure. (a) Foreign body seen peeking through the tear in bronchus intermedius marked by lines. (b and c) Retrieval being attempted with thoracoscopic instruments. (d) Foreign body retrieved and seen stuck to metal tip of the instrument due to magnetic properties of the foreign body

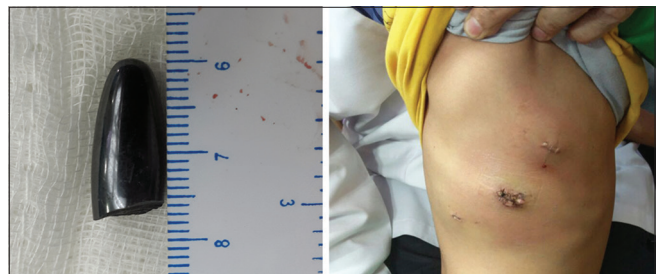


Figure 3: Retrieved foreign body and the surgical scars on 3rd postoperative day

gases to escape to right bronchus to do underwater leak test on the repaired BI. There was no air leak. A 20 Fr chest tube was placed in the right chest cavity, instruments and the two working ports were removed. Moreover, the telescope was withdrawn to just allow a view of inside. The endotracheal tube was now withdrawn into the trachea under bronchoscopic guidance to check for inflation of

the right lung. The right upper lobe expanded immediately whereas the middle and lower lobes expanded slowly. At the end, complete expansion of all the lobes was observed. The telescope was also removed, and all the ports were closed. The total operating time (incision to closure) was 45 min. The child withstood the procedure well, was extubated on the table and shifted to recovery room. The air entry was now good and equal on both the sides, there was no air leak in the chest tube, and postoperative chest X-ray showed good lung expansion. He was allowed orally 2 h later and discharged the next day on parent's request on oral antibiotics and pain killers with ICD *in situ*. He was reviewed in the outpatient department 2 days later, and the chest tube was removed. He is presently doing well.

DISCUSSION

FB aspiration into the airway is common and continues to be a cause of morbidity and mortality in young children. History, clinical examination, and X-rays usually provide the diagnosis. The real challenge lies in retrieval of the FB without physical injury to airway and in a safe way. Rigid bronchoscopy is the most suitable procedure for its removal.^[1] Bronchoscopy is a life-saving procedure for FB removal in an emergency where it serves both as a diagnostic as well as a therapeutic procedure.^[2] Most of the procedures are carried out with the rigid ventilating bronchoscope and grasping forceps, under general anesthesia. This system has saved innumerable precious lives up till now.^[3] However, several complications of rigid bronchoscopy such as trauma to the teeth, oropharynx, vocal cords or other glottic structures, laryngospasm, pneumothorax, hemorrhage, and even death have been reported.^[4,5] Attempt to remove stuck FB can cause injury to tracheobronchial tree which may then necessitate surgical intervention as in our case. Conventionally, such injuries have been managed by thoracotomy. However, in

view of the less invasive nature of thoracoscopy together with lesser pain, shorter recovery, shorter chest tube duration time and better cosmetic outcomes, it should be preferred over open approach wherever such approach is feasible, and necessary expertise is available.

CONCLUSION

Thoracoscopy is a safe and efficient approach for management of patients with aspirated FB in whom initial attempts at removal by rigid bronchoscopy has failed or has caused inadvertent injury to the airway. However, hemodynamic stability of the patient and availability of necessary expertise are mandatory requirements for such endeavors.

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Conflicts of interest

There are no conflicts of interest.

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