

# Flexible bronchoscopy through Rigid bronchoscope for airway foreign body: a good marriage of convenience!

Kamal Singhal<sup>1</sup>, meenu singh<sup>2</sup>, Ravi Kanojia<sup>1</sup>, joseph mathew<sup>2</sup>, PANKAJ VAIDYA<sup>3</sup>, and Amit Pandey<sup>3</sup>

<sup>1</sup>Postgraduate Institute of Medical Education and Research

<sup>2</sup>Post Graduate Institute of Medical Education and Research,

<sup>3</sup>PGIMER

August 17, 2020

## Abstract

A 12-year-old girl presented with chronic suppurative lung disease secondary to an old forgotten, foreign body (plastic whistle) in the right lower lobe bronchus, confirmed by Contrast enhanced computer tomography (CECT) chest. Rigid bronchoscopic removal was attempted twice but the foreign body could not be removed. Under general anesthesia, a flexible bronchoscope was inserted through the rigid bronchoscope and the foreign body was grasped and removed using rat-toothed forceps inserted through the suction channel of the flexible scope. Although there are a few reports of sequential use of flexible and rigid bronchoscopies, this report highlights the feasibility and utility of flexible through rigid bronchoscopy technique for foreign body removal in the distal airways.

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## Authors:

Kamal K. Singhal<sup>a</sup>, MD,

Meenu Singh<sup>a</sup>, MD,

Ravi P. Kanojia<sup>b</sup>, MS

Joseph L.Mathew<sup>a</sup>, MD, PhD

Pankaj C. Vaidya<sup>a</sup>, MD

Amit Pandey<sup>b</sup>, MS

<sup>a</sup>Division of Pediatric Pulmonology, Department of Pediatrics, PGIMER, Chandigarh, India.

<sup>b</sup>Department of Pediatric Surgery, PGIMER, Chandigarh, India.

**Conflict of Interest Disclosures (includes financial disclosures):** The authors have no conflicts of interest relevant to this article to disclose.

**Funding/Support:** No funding was secured for this study.

## Address correspondence to :

Meenu Singh

Professor of Pediatrics Chief, Pediatric Pulmonology

Advanced Pediatrics Centre

PGIMER

Chandigarh, India 160012

Email: meenusingh4@gmail.com

Phone: 0091-172-2755306 9914208306 9814117152

**Keywords:** Bronchiectasis, Rat-toothed forceps, Failed extraction, Distal foreign body

**Short Title:** Flexible through Rigid bronchoscopy for foreign body

## Introduction:

Aspiration of a foreign body is commonly reported among children. Although considered the gold standard for extraction of airway foreign bodies, rigid bronchoscopy fails in up to 7%<sup>1,2</sup> of cases. Although there are reports of successful use of flexible bronchoscope for airway foreign body removal it has many limitations. We describe an adolescent patient wherein a distally placed airway foreign body after the failure of removal with rigid bronchoscope twice could be removed successfully using flexible-through-rigid bronchoscopy technique. We discuss the advantages of this technique over either of the scopes used alone.

## Case:

A 12-year-old girl presented with 3 year history of cough and purulent expectoration, responding partially to inhaled bronchodilators. There was no seasonal or diurnal variation, wheezing, chest pain, hemoptysis or cyanosis. There were intermittent undocumented fever episodes over the past two years. There was decreased exertional capacity over the past 6 months. There was no history of change in appetite, ear or nasal symptoms, aggravating or relieving factors, vomiting, epigastric discomfort, severe multi-systemic infections, or malabsorption. There was no contact with active tuberculosis. Examination revealed normal vital signs and oxygen saturation in room air. Weight, height, body mass index of 41kg, 156cm and 16.85 respectively were normal for age and height. There was no digital clubbing but no pallor, cyanosis, or lymphadenopathy. Respiratory system examination revealed coarse crackles in right infra-scapular area with increased vocal resonance and fremitus. Chest roentgenogram (Figure 1A) and Contrast enhanced computer tomography (CECT) (Figure 1B, 1D) showed right lower lobe volume loss with cystic bronchiectasis and foreign body in right lower lobe bronchus. Review of history revealed an episode of inhaling a plastic whistle about 5 years back. The child did not tell her parents and hence no attempt was made to remove it.

Flexible bronchoscopy revealed a foreign body in the right lower lobe bronchus with purulent secretions and granulation tissue. Rigid bronchoscopy (7.5 french sheath, 43 cm length) done under general anesthesia confirmed the foreign body but it could not be removed despite multiple attempts using optical forceps (5.5mm with length 50 cm) as the object was out of reach of the forceps. A second attempt was made after administering oral prednisolone for 48 hours. Still, the foreign body could not be removed after multiple attempts using.

Therefore a flexible bronchoscope (Olympus BF-Q190, outer diameter 4.9 mm) as inserted through the rigid scope size (7.5 french sheath, 43 cm length). After placing the flexible bronchoscope tip just above the foreign body, rat-toothed forceps was inserted through the suction channel of the flexible scope. The foreign body was grasped with rat-toothed forceps and pulled into the rigid scope. The rigid scope along with the flexible scope and the foreign body inside was removed (Figure 1C) and child reintubated. The post-operative period was uneventful and the child was discharged after three days with advice to continue chest physiotherapy to drain the right lower lobe. During follow-up over 8 months, the child had markedly improved. There were no episodes of cough or fever or exercise intolerance. She had gained 12 kg weight (from 41kg).

## Discussion:

Aspiration of a foreign body is commonly reported among children. It can be life-threatening and it can lead to life-long morbidities like chronic suppurative lung disease. Since its first use by Gustav Killian, extraction of trachea-bronchial foreign body with rigid bronchoscopy is presently considered the gold-standard<sup>1</sup>. Failure of rigid bronchoscopic removal necessitates thoracotomy and bronchotomy. The rate of failed extraction of airway foreign bodies after first rigid bronchoscopy varies from 0.3 to 7%<sup>1,2</sup>.

Although rigid bronchoscopy is considered the gold standard for foreign body removal, many recent reports suggest that in experienced hands Flexible bronchoscopy done under conscious sedation also to be safe and effective<sup>2,3</sup>. The obvious advantage of flexible bronchoscopic foreign body removal include the ability to reach airways difficult to access through a rigid bronchoscope (notably right upper lobe and basal segments of lower lobe bronchi). If performed under conscious sedation, there are reduced risks of general anesthesia and dependence on busy operation theatres. The main disadvantage of flexible bronchoscopy is that it further narrows the airway and compromises ventilation, unlike a rigid scope where ventilation can be controlled through the scope. Flexible through rigid scope technique thus combines the best of both: supported ventilation through the rigid scope and access to the deeper airways through flexible scope.

Although there are few reports of sequentially combined use of flexible and rigid scopes there are scarce reports of flexible through rigid scopy technique for removal of airway foreign body. Ruegemer et al reported an eight year boy who aspirated a 'ball-bearing' in right lower lobe bronchus and could not be removed on two rigid bronchoscopic removal attempts using optical FB forceps, ball-bearing forceps, Segura wire basket, rigid FB basket and Fogarty catheter<sup>4</sup>. After steroids for 48 hours it was removed using four-wire helical basket inserted through the suction channel of flexible bronchoscope which was inserted through rigid bronchoscope<sup>4</sup>.

Eyekpegha et al reported a 6-year-old boy who had a history suggestive of an aspirated base cap of a pen but still it could not be visualized despite two rigid and one flexible scopies<sup>5</sup>. The foreign body was finally demonstrated on a CECT imaging and removed by combined rigid and flexible scopy<sup>5</sup>.

**Conclusion:** This report highlights that flexible bronchoscopy through a rigid bronchoscope is a feasible option in distal airway foreign body, not amenable to rigid scopy alone. This obviates the need for more invasive surgeries like thoracotomy and bronchotomy.

## Reference:

1. Zhang X, Li W-X, Cai Y-R. A time series observation of Chinese children undergoing rigid bronchoscopy for an inhaled foreign body: 3,149 cases in 1991-2010. *Chin Med J*. 2015 Feb 20;128(4):504–9.
2. Tang L-F, Xu Y-C, Wang Y-S, Wang C-F, Zhu G-H, Bao X-E, et al. Airway foreign body removal by flexible bronchoscopy: experience with 1027 children during 2000-2008. *World J Pediatr*. 2009 Aug;5(3):191–5.
3. Kapoor R, Chandra T, Mendpara H, Gupta R, Garg S. Flexible Bronchoscopic Removal of Foreign Bodies from Airway of Children: Single Center Experience Over 12 Years. *Indian Pediatr*. 2019 15;56(7):560–2.
4. Ruegemer JL, Perkins JA. Combined rigid and flexible endoscopic removal of a BB foreign body from a peripheral bronchus. *Int J Pediatr Otorhinolaryngol*. 1999 Jan 25;47(1):77–80.
5. Eyekpegha OJ, Onakpoya UU, Obiajunwa PO, Famurewa OC, Ogunrombi AB. Missed Distal Tracheal Foreign Body in Consecutive Bronchoscopies in a 6-year-old Boy. *Niger J Surg*. 2017 Jun;23(1):67–70.

