

# Complications of Rigid Bronchoscopy during Foreign Body Removal in Children

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## ABSTRACT

**Background:** Tracheobronchial foreign body aspirations, which threaten lives in childhood, also carry potential risks during and after bronchoscopy.

**Aim:** To determine the frequency of various complications associated with rigid bronchoscopy for the management of foreign body tracheobronchial tree in children.

**Methods:** This descriptive study was conducted in the Department of ENT and Head and Neck Surgery, Hayatabad medical complex Peshawar from June 2011 to Dec 2011 consisting of 103 cases of foreign body inhalation. All patients were treated by bronchoscopy and any encountered complication was noted and treated accordingly.

**Results:** Among 103 patients foreign body inhalation was common in 3-4 years of age and was more common in right bronchus. Hypoxia and bradycardia occurred as a result of obstruction during bronchoscopy in 16 patients, laryngeal edema, spasm bronchospasm in 13, bleeding in 11, pneumothorax in 2 and pneumomediastinum in 1 patient. No patients needed thoracotomies because of foreign body aspiration and no death was reported.

**Conclusion:** Bronchoscopy, performed for tracheobronchial foreign body aspiration, carries a potential life-threatening risk during and after the process. The clinician needs to be aware of these risks, take proper precautions, and perform bronchoscopy.

**Key words:** Bronchoscopy, Foreign body, Complications

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## INTRODUCTION

Foreign body aspiration is one of the most important causes of morbidity and accidental deaths in childhood<sup>1,2,3,4</sup>. Features and number of foreign body aspiration are affected by socioeconomic and cultural factors. Different types of foreign bodies are seen in various age groups and patients of either sex. Foreign bodies are of different nature including organic and inorganic, living, non-living, metallic and non-metallic, are inhaled by the patient<sup>3,4</sup>. Clinical features depend on the size and site of foreign body ranging from asymptomatic patient to severe respiratory failure<sup>4,5</sup>. Chest radiograph is mostly diagnostic in foreign body inhalation. It may show hyperinflation, atelectasis, or secondary pneumonia in 80% of cases.<sup>4,6-10</sup> Several studies suggested that foreign body airway is best treated by bronchoscopy<sup>1,10,11</sup>. Most of the deaths occur before reaching hospital. Taking the foreign body out of the tracheobronchial system is mostly life saving. For children who reach the hospital, the most appropriate choice of methods for removal of the foreign body is bronchoscopy. However, during and after bronchoscopy life-threatening complications can be

observed<sup>12</sup>. The purpose of this study is to review complications and precautions that need to be taken against possible risks during rigid bronchoscopy for removal of foreign body in children.

## PATIENTS AND METHODS

This Descriptive study was conducted at the ENT Department, Hayatabad Medical Complex Peshawar from June 2011 to December 2011. The inclusion criteria were patients with history of foreign body inhalation. Patients with history of bronchoscopy at some other center and those who presented with complications were excluded from the study. The diagnosis of foreign body inhalation was made on the basis of detailed history, examination and radiological investigations. The purpose and benefits of the study were explained to all attendants and a written informed consent was obtained. All patients underwent rigid bronchoscopy under general anesthesia. Complications occurring during the procedure, in the recovery room and thereafter in the ward like cardiac arrest, bleeding, pneumothorax and infection in the initial 24 hours detected by symptoms and signs as well as radiology were noted and treated accordingly. Data was collected using a proforma designed for the purpose. The data was stored and analyzed in SPSS version 11.

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## RESULTS

A total of 103 patients were included in this study from Jan 2010 to Jan 2014. Male predominance (62%) was seen with a minimum age of 6 months and a maximum of 10 years. Foreign body was more common in 3-4 years of age followed by 5-6 years (Table 1). Most of the foreign bodies were organic objects and most of foreign them presented with in first two days of inhalation. Foreign body was commonly seen in right bronchus followed by left bronchus and trachea during bronchoscopy. No patients died during or after bronchoscopy. The most common complication encountered during bronchoscopy was Hypoxia and bradycardia (15.5%) which was treated by oxygen. Although the foreign body was taken out after the bronchoscopy, laryngeal edema, laryngeal spasm and/or bronchospasm with insufficient ventilation were observed in 13(12.6%) patients. Tracheal and bronchial bleeding was seen in 11 (10.7%) patients which was treated conservatively. Infection in 9 (8.7%) patients was treated by intravenous antibiotics. Pneumothorax was seen in 2 (1.9%) patients which required chest intubation. A patient who had pneumomediastinum after bronchoscopy needed no treatment and spontaneously recovered.

Table 1: Descriptive statistics of the data

Variable	No.	%
<b>Age (years)</b>		
0 – 2	20	19.4
3 – 4	36	34.9
5 – 6	25	24.6
7 – 8	14	13.5
9 – 10	8	7.6
<b>Duration of foreign body (Days)</b>		
0 – 2	59	57.3
3 – 4	23	22.3
5 – 30	16	15.6
> 30	5	4.8
<b>Site of foreign body</b>		
Right bronchus	59	57.3
Left bronchus	36	34.9
Trachea	8	7.8
<b>Complications</b>		
Hypoxia and bradycardia	16	15.5
Laryngeal edema, laryngospasm	13	12.6
Bleeding	11	10.6
Infections	9	8.7
Pneumothorax	2	1.9
Pneumomediastinum	1	0.9

## DISCUSSION

Tracheobronchial foreign body aspiration is the most common cause of death due to acute asphyxia among children.<sup>13,14</sup> Death takes place in a short time in total tracheal obstruction. If only a little air can flow, patients may not have much time to reach the hospital. Another danger is that with strong respiratory effort, a partial obstruction with the foreign body or mucosal edema can turn into a total obstruction. The incidence of foreign bodies airway is about 10% in the literature<sup>15,16,17</sup>.

The swelling of the inhaled object by absorption of moisture and changes in the form of the obstruction have been reported in the literature.<sup>18,19</sup> Organic objects are especially apt to taking moisture. Nevertheless, inorganic objects can also be observed to swell in the airway<sup>20,21</sup>. Life-threatening risks before and during bronchoscopy are not limited to asphyxia<sup>22</sup>. Infection caused by foreign body aspiration is one of the most important risks.<sup>23</sup> As occurred in two of our cases, bronchopneumonia can be the cause of mortality, especially in young children, even if the object is removed. Pulmonary infection due to a foreign body aspiration is frequently reported in the literature<sup>22,24</sup> as seen in our study also. In one of our cases, after the plastic object in the right main bronchia was removed, pus, which had gathered in the distal end of the obstruction caused by the object, filled the other bronchial system as well. Laryngeal edema and laryngeal/tracheal/bronchial spasm are complications, which can develop depending on the length of the process during rigid bronchoscopy<sup>3,4,11</sup>. Edema and spasm may get worse due to aggressive manipulations when removing the object as observed in our study also. Granulation tissue due to a foreign body usually increases with the length of time the object is in the bronchial system. During bronchoscopy, bleeding usually occurs because of the granulation tissue and mucosa damages, and is rarely serious<sup>4,25</sup> which is consistent with our study. It is reported that especially sharp objects like needles rarely leave the bronchopulmonary system<sup>17,25</sup>. Situations requiring invasive operations to remove objects that are too distally located for bronchoscopy carry life-threatening risks<sup>5,26</sup>.

## CONCLUSION

Although bronchoscopy performed to remove aspirated foreign bodies is a relatively an easy and common procedure, it carries preventable life-threatening risks during and after the process.

Therefore, the clinician should take into consideration the characteristics of the inspired foreign body and the clinical condition of the patient during bronchoscopy.

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