International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Impact Factor (2012): 3.358

A Study of Clinical Presentations and Complications of Foreign Body in the Bronchus- Our Experience

Dr. Omkar Halwai[1], Dr. Ameya Bihani[2], Dr. Arpit Sharma[3], Dr. Jyoti Dabholkar[4]

[1]Senior Registrar, Department of Otorhinolaryngology and Head Neck Surgery, Seth G.S. Medical College and King Edward VII Memorial Hospital, Mumbai, India – 400012

[2] Post Graduate Student, Department of Otorhinolaryngology and Head Neck Surgery, Seth G.S. Medical College and King Edward VII Memorial Hospital, Mumbai, India – 400012

[3]Assistant Professor, Department of Otorhinolaryngology and Head Neck Surgery, Seth GS Medical College and King Edward VII Memorial Hospital, Mumbai, India - 400012

[4]Professor and Head of Department, Department of Otorhinolaryngology and Head Neck Surgery, Seth GS Medical College and King Edward VII Memorial Hospital, Mumbai, India - 400012

Abstract: ***Objectives:*** ***In this study, we studied the varied clinical presentations and complications of foreign body in the airway and the complications of bronchoscopy, if any.*** ***Methods:*** ***A prospective observational clinical study in a tertiary care centre from June 2010 to May 2012 included 46 paediatric patients aged less than 12 years with suspected foreign body aspiration, all of whom underwent Rigid Bronchoscopy under General Anaesthesia. All the patients were subjected to History Taking, Clinical Examination & Investigations(Pre and Post-op X-Ray Chest and CT Virtual Bronchoscopy, if required).*** ***Results:*** ***The most common age of presentation was 1 to 3 years mostly presenting within 48 hours of aspiration. 87% of the patients had a definite history of aspiration, with Cough(69.5%) and Unilateral Decreased Air Entry(91.3%) being the most common symptom and clinical sign respectively. Emphysema was the most common finding on X-ray Chest(71.7%) and the sensitivity of CT Virtual Bronchoscopy was 80%. Majority of the Foreign Bodies were Organic (84.7%-esp. peanut) and mostly found in the Right Bronchus(47.8%). Post-op complications were rare (Pneumothorax, Pneumonic patch) and were managed conservatively.None of the patients required a Tracheostomy and there was Zero Mortality.*** ***Conclusions:*** ***A positive history is by itself an indication for Bronchoscopy. Clinical Signs and X-Ray changes should guide the clinician towards the possible location of the foreign body. CT Virtual Bronchoscopy can be done in suspected cases with no specific history or clinical signs. Bronchoscopy can be done with minimal complications when performed by co-ordination of expert surgeon and anaesthetist.***

Keywords: bronchoscopy; foreign body; bronchus; airway; aspiration; pediatric airway

1. Introduction

Foreign Body in the Airway or Foreign Body Aspiration is an accidental but life threatening Condition. It requires immediate intervention and is a medical & surgical emergency. It can be fatal and hence requires a systematic approach towards its management.

Gustav Killian performed the first bronchoscopic foreign body removal in 1897. He removed a pork bone in an awake patient using cocaine as a local anaesthetic [1]. Chevalier Jackson (1865 – 1958) was a pioneer in the field of Bronchoscopy. Most of the steps of Bronchoscopy as it is done today were described by him. He even designed instruments for removal of specific foreign bodies.

Bronchoscopy is a life saving procedure in cases of foreign body aspiration. It has evolved over the years with improvement in equipment and anaesthesia facilities to become a relatively safe procedure with little or no complications in experienced hands. It is a procedure which is challenging and can be associated with complications as the surgeon shares the airway with the anaesthetist. But in experienced hands and by taking the utmost precautions, it can be a complication-free procedure with good results.

2. Aims and Objectives

1. To study the varied clinical presentations and complications of foreign body in the bronchus.
2. To study the preponderance of the foreign body to the right/left bronchus.
3. To study the complications of bronchoscopy, if present.
4. To study the mortality rate, if any, associated with bronchoscopy.

3. Materials and Methods

A Prospective Observational Study of 46 paediatric patients aged below 12 years with suspected Foreign Body Aspiration was done between June 2010 to May 2012 in a tertiary care centre. All selected patients were subjected to detailed history taking and clinical examination including General Examination & Respiratory system examination, Pre & Post bronchoscopic X- Ray chest PA view. CT Virtual bronchoscopy was done in certain patients when required. Rigid Bronchoscopy with Foreign Body Removal was done under General Anaesthesia using Jet Ventilation Technique. Post operatively follow up was done at 7 days, 1 month and 2 months.

Licensed Under Creative Commons Attribution CC BY

4. Results

4.1 Demographics:

Among 46 cases of suspected foreign body aspiration, 28 (60.8%) patients were male whereas 18 (39.2%) patients were female The most common age of presentation was between 1 to 3 years (23 patients; 50%) with peak incidence during the 2nd year of life (13 patients – 28%), a majority of whom presented within 48 hours of onset of symptom (36 patients; 78%) with the time of presentation ranging from 1 hour to 120 days. The Mean of duration of symptoms was 6.5 days.

4.2 Clinical Features

40 patients (87%) had a definite history of foreign body aspiration, whereas 6 patients (13%) had no definite history of foreign body aspiration(but had clinical features suggestive of foreign body aspiration). All patients with inorganic foreign bodies had a definite history of foreign body aspiration. The 6 patients who had no history of foreign body aspiration had organic foreign bodies on bronchoscopy. In presenting symptoms, Cough was the most common (69.5%) followed by Breathlessness (67%). Other Symptoms included Fever (34.8%), Chest Infection (8.6%) and Noisy Breathing (8.6%). 2 patients (4.3%) were Asymptomatic at presentation.

In clinical signs, the most common sign detected was Decreased Air Entry in 42 patients (91.3%). The other clinical signs in decreasing order of frequency were Chest Retractions in 17 patients (36.9%), Rhonchi in 9 patients (19.5%) and Stridor in 2 patients (4.3%). In one patient there were no clinical signs elicited (but had a history of foreign body aspiration). The most common finding on Pre-op X-ray Chest was Emphysema in 33 patients (71.7%).[Fig.1, 2] The other Pre-op X-ray findings were Collapse in 10 patients (21.7%) and Mediastinal Shift in 4 patients (8.7%). The Pre-op X-ray Chest was Normal in 5 patients (10.9%). Radio opaque foreign bodies were seen in 2 cases. CT Virtual Bronchoscopy was done in 10 patients out of whom foreign body was detected in 8 patients. In the remaining 2 patients with negative CT findings, a foreign body was found on bronchoscopy, giving a Sensitivity of 80% for CT virtual Bronchoscopy. [Fig. 3]

4.3 Intraoperative Findings

The foreign body removed via Bronchoscopy was Organic in 39 cases (84.7%) and Inorganic in 7 patients (15.3%). The most common foreign body found was peanut (organic). The other organic foreign bodies were Custard apple seed, Sapodilla seed maize, betel nut and tamarind seeds.

The inorganic foreign bodies found were Whistle in 3 cases[Fig. 4], metal tracheostomy tubes (broken outer part) in 2 cases[Fig. 5] and parts of plastic toys in 2 cases. Only one patient required a second look bronchoscopy. The Foreign Body was found in the Right Bronchus in 22 patients (47.8%), in the Left Bronchus in 18 patients (39.1%), in the trachea in 5 patients (10.8%) and in both bronchi in 1 patient (2.3%).

4.4 Post-OP Complications

The Post-op X-ray Chest was abnormal in 3 cases (6.5%) whereas it was normal in 93.5% patients. 2 patients developed a small unilateral pneumothorax post operatively which resolved on conservative management within 48 hours. One patient had a pneumonic patch on the Post-op X-ray Chest (although the patient was clinically stable) which resolved on giving IV antibiotics for 5 days. The rest of the patients (47) had normal X-ray Chest with complete resolution of pre-op changes 12 hours after the procedure.

Post-op Complications occurred in 3 patients (6.5%). 2 patients developed unilateral pneumothorax post operatively. They were managed conservatively by keeping them Nil by Mouth, round the clock 100% oxygenation and IV antibiotics. The pneumothorax resolved within 48 hours in both the patients. One patient had a cardiac arrest intraoperatively and required cardiopulmonary resuscitation. The procedure was abandoned and the patient was revived. The patient was given IV steroids and antibiotics and taken up for bronchoscopy again after 48 hours and the foreign body was removed. The patient was stable post operatively and the post op X-ray Chest was normal. The patient was discharged 3 days after the second bronchoscopy. None of the patients in the study required a tracheostomy.

There was Zero mortality in our study, however, one patient had intraoperative cardiac arrest and was revived subsequently. On follow up there were no symptoms or complications in any of the patients.

5. Discussion

Foreign Body in the airway is a common condition in the paediatric population in the Emergency department. Bronchoscopy with foreign body removal is a life saving procedure which requires experience and skill as the surgeon shares the airway with the anaesthetist.

Foreign bodies in the airway are most commonly seen in the 1st to 3rd years of life [2, 3]. The reason for most of cases occurring in the above age group is that the pincer grasp develops in children at the age of 9 months, following which they develop a habit of picking up random objects and putting them in their mouth, leading to increased risk of aspiration. Majority of the patients are males [4, 5]

These patients generally have a positive history of foreign body aspiration, although 10-13% may have a foreign body without a definitive history of aspiration [6, 7]. The time gap between aspiration and presentation to the hospital is generally between 12 to 48 hours [8] but may get delayed either due to difficult accessibility to hospital or failure of diagnosis by primary health care personnel.

The most common presenting symptoms are Persistent Cough [3, 9] followed by Breathlessness, Fever, Recurrent Chest Infections and Noisy Breathing. Shubha AM et al [10] observed in their retrospective study that the clinical triad of cough, respiratory distress and stridor was highly predictive of Foreign Body Aspiration.

Licensed Under Creative Commons Attribution CC BY

In our study, the most common clinical sign was Decreased Air Entry in about 91% of the patients, followed by Chest Retractions, Rhonchi, Stridor and no aberrant findings in one patient. But, some studies like Sissokho et al [9] observed that auscultation of the lungs was negative in 25% of cases. Ciftci AO et al [4] observed that 14% of the patients with foreign bodies on bronchoscopy and 46% of the patients with negative bronchoscopies had normal physical findings. In the study conducted by Midulla F et al [3], the most frequent physical findings observed were persistent cough (75%), localized decreased breath sound (62.8%) and localized wheezing (30%). The clinical triad (concomitant cough, localized wheezing and decreased breath sounds) was present in 11 patients (15.7%). All clinical findings had a high positive predictive value with poor sensitivity.

Chest X-ray is the first and most commonly done radiological investigation due to easy availability and swiftness of diagnosis. The findings range from Emphysema, Collapse, Mediastinal Shift and even Normal roentgenograms. Baharloo et al [11] observed that air trapping was more common in the children in the Pre-op X-Ray chest findings. In the study by Zerella et al [6], the surgeon thought that radiographs were normal at the time of bronchoscopy in 110 patients out of 265 who had foreign bodies. The sensitivity and specificity of radiological findings for suspected foreign body aspiration was 76.8% and 50%, respectively, as observed by Kiyan G et al [12].

The indications for which CT Virtual Bronchoscopy was done in our study were:

1. There was no definite history of Foreign Body Aspiration but there was high clinical suspicion due to clinical or X-ray findings.
2. There was no definite history of Foreign Body Aspiration but the patients had prolonged symptoms not responding to treatment.
3. There was a definite history of Foreign Body Aspiration but the Clinical and X-ray findings were normal, thus rendering it difficult to confirm the presence and site of foreign body.

In our study, CT Virtual Bronchoscopy was done in 10 patients out of whom a foreign body was detected in 8 patients. In the remaining 2 patients with negative CT findings, a foreign body was found on bronchoscopy, giving a Sensitivity of 80% for CT virtual bronchoscopy.

Haliloglu et al [13] concluded that Helical CT scanning with virtual bronchoscopy should be performed in only selected cases with suspected foreign body aspiration when the chest radiograph is normal and the clinical diagnosis suggests aspirated foreign body.

In a study of 12 patients by Bhat KV et al [14], foreign bodies detected by virtual bronchoscopy were confirmed by rigid bronchoscopy. In one case, a mucous plug was perceived as a foreign body on virtual bronchoscopy. In another case, a minute foreign body was missed on virtual bronchoscopy. The following parameters were calculated: sensitivity- 92.3 per cent; specificity- 85.7 per cent; validity- 90 per cent; positive likelihood ratio- 6.45; and negative likelihood ratio- 0.089. In patients with a suspicion of foreign body ingestion, initial virtual bronchoscopy may help to determine the presence and exact localization of the foreign body and if negative, may reduce the number of unnecessary rigid bronchoscopies.

Mostly foreign bodies in the paediatric population are organic in nature, most common being nuts, especially peanuts [9, 10] and seeds (Custard apple, Sapodilla). In the pioneering study by Chevalier Jackson et al [15], of the foreign bodies removed by bronchoscopy, 52% were organic (nuts, seeds, shells etc.) whereas the remaining 48% were inorganic (Pins, needles etc.).

Foreign Bodies more commonly lodge in the Right Bronchus due to the following reasons [16]:

- Greater Diameter.
- Lesser Angle of Deviation from Tracheal Axis.
- Carina to the left of midline of Trachea.
- Greater Volume of Air going into it during Inspiration.

The Site of lodgment depends on size of the foreign body. Small foreign bodies usually arrested at segmental bronchi. Slender objects (pins, needles) go more peripheral via ratchet like action. Middle lobe Bronchus rarely involved due to anteriorly placed orifice.

In most of the studies the foreign body was most commonly found in the right bronchus [11, 17]. Post-Op X-Rays mostly revert to normal, but a few cases show Pneumothorax and pneumonic patches. In our study, Post-op Complications occurred in 3 patients (6.5%). 2 patients developed unilateral pneumothorax post operatively.1 patient had a cardiac arrest intraoperatively and required cardiopulmonary resuscitation. None of the patients in the study required a tracheostomy. There was Zero mortality in our study.

Ciftci AO et al [4] observed that worsening of respiratory tract infection (n = 13), cardiac arrest (n = 6), laryngeal edema (n = 5), pneumothorax (n = 5), pneumomediastinum (n = 2), tracheal laceration (n = 2), and bronchospasm (n = 2) were the life-threatening complications observed in 21 (4%) patients with FBA and 14 (14%) patients without FBA (P <.05). There were 5 (0.8%) deaths. Zhijun C et al [(19)] observed that among 1428 patients, tracheotomy was performed in 4 patients (0.28%) and 3 patients (0.21%) died in their study. Analyzing the above data, we conclude that if the surgeon is experienced and the requisite precautions are taken, complications of bronchoscopy can be kept to a minimum.

6. Summary and Conclusions

- A positive history of Foreign Body Aspiration is by itself an indication for Bronchoscopy.
- Clinical Signs like Unilateral Decreased Air Entry and X-Ray changes should guide the clinician towards the possible location of the foreign body.
- The help of High Resolution CT Virtual Bronchoscopy can be taken in cases with no specific history or clinical signs.

Licensed Under Creative Commons Attribution CC BY

- But, a foreign body cannot be ruled out on the basis of Negative History or Absence of Clinical Signs alone, and in such cases, the importance of the surgeon's clinical judgment cannot be understated.
- Bronchoscopic Removal of the Foreign Body is known to be inherently associated with a high risk of mortality but if performed by the co-ordination of an expert team of surgeons and anaesthetists, it can be a life saving procedure with minimal complications and nil mortality.

References

[1] Armin Ernst: Introduction to Bronchoscopy, 1st Edition, Cambridge Medicine, p.1
[2] Shivakumar AM, Naik AS, Prashanth KB, Shetty KD, Praveen DS: Tracheobronchial foreign bodies, Indian J Pediatr. 2003 Oct;70(10):793-7
[3] Midulla F, Guidi R, Barbato A, Capocaccia P, Forenza N, Marseglia G, Pifferi M, Moretti C, Bonci E, De Benedictis FM: Foreign body aspiration in children, Pediatr Int. 2005 Dec;47(6):663-8
[4] Ciftci AO, Bingöl-Koloğlu M, Senocak ME, Tanyel FC, Büyükpamukçu N: Bronchoscopy for evaluation of foreign body aspiration in children, J Pediatr Surg. 2003 Aug;38(8):1170-6
[5] Saki N, Nikakhlagh S, Rahim F, Abshirini H: Foreign body aspirations in infancy: a 20-year experience, Int J Med Sci. 2009 Oct 14;6(6):322-8
[6] Zerella JT, Dimler M, McGill LC, Pippus KJ: Foreign body aspiration in children: value of radiography and complications of bronchoscopy, J Pediatr Surg. 1998 Nov;33(11):1651-4.
[7] Gluncić I, Pavlov N, Gluncić V: Aspiration of foreign bodies in the bronchi in children (Article in Croatian), Lijec Vjesn. 2000 Mar;122(3-4):70-3
[8] Schimpl G, Weber G, Haberlik A, Höllwarth ME: Foreign body aspiration in children. The advantages of emergency endoscopy and foreign body removal (Article in German), Anaesthesist. 1991 Sep; 40(9):479-82
[9] Sissokho B, Conessa C, Petrognani R: Rigid endoscopy and laryngo-tracheo-bronchial foreign bodies in children: observations apropos of 200 endoscopies conducted in a tropical setting(Article in French), Med Trop (Mars).1999; 59(1):61-7
[10] Shubha AM, Das K: Tracheobronchial foreign bodies in infants, Int J Pediatr Otorhinolaryngol. 2009 Oct;73(10):1385-9
[11] Baharloo F, Veyckemans F, Francis C, Biettlot MP, Rodenstein DO: Tracheobronchial foreign bodies: presentation and management in children and adults, Chest. 1999 May;115(5):1357-62
[12] Kiyan G, Uygun I, Karadağ B, Tuğtepe H, Iskit SH, Dağli TE: Foreign body aspiration in children (Article in Turkish), Kulak Burun Bogaz Ihtis Derg. 2004;12(5-6):128-33
[13] Haliloglu M, Ciftci AO, Oto A, Gumus B, Tanyel FC, Senocak ME, Buyukpamukcu N, Besim A: CT virtual bronchoscopy in the evaluation of children with suspected foreign body aspiration, Eur J Radiol. 2003 Nov;48(2):188-92
[14] Bhat KV, Hegde JS, Nagalotimath US, Patil GC: Evaluation of computed tomography virtual bronchoscopy in paediatric tracheobronchial foreign body aspiration, J Laryngol Otol. 2010 Aug;124(8):875-9. Epub 2010 Apr 29
[15] Jackson, Chevalier, and Jackson, Chevalier L.: Diseases of the Air and Food Passages of Foreign Body Origin. Philadelphia, W.B. Saunders Company, 1936, Appendix p.1.
[16] Jackson, Chevalier: Foreign Bodies in the Larynx, Trachea, Bronchi and Esophagus Considered, Tr. Soc. Laryng. Otol. & Rhinol., A.M.A.,1917, pp. 35-56
[17] Zhijun C, Fugao Z, Niankai Z, Jingjing C: Therapeutic experience from 1428 patients with pediatric tracheobronchial foreign body, J Pediatr Surg. 2008 Apr;43(4):718-21

Figures



Figure 1: Pre-op X-Ray Chest Showing Bilateral Emphysema (Patient had Sugar-Apple Seed in Right Bronchus)

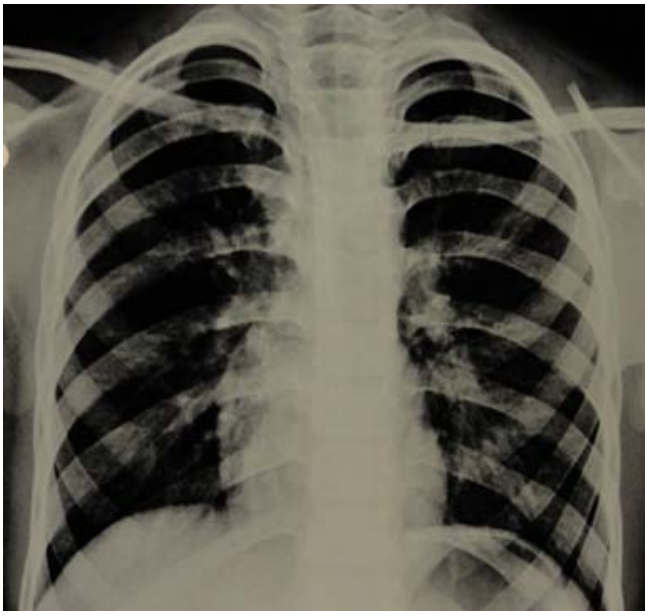


Figure 2: Post-op X-Ray of same patient as Fig. 1 – Normal

Licensed Under Creative Commons Attribution CC BY

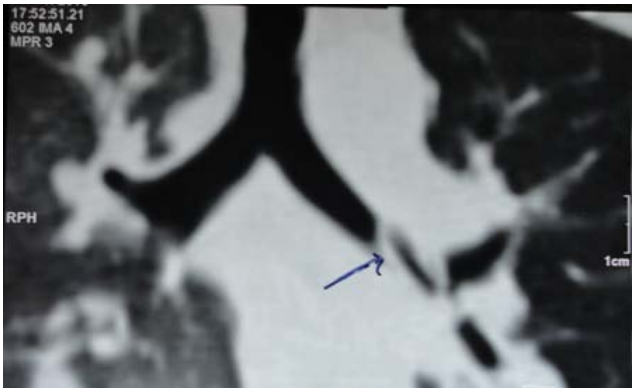


Figure 3: CT Virtual Bronchoscopy (Coronal Image) showing Foreign Body(Whistle) in Left Main Bronchus

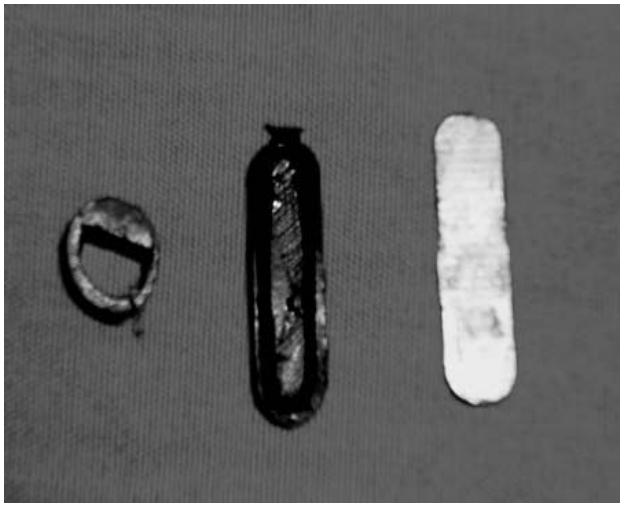


Figure 4: Whistle (Disassembled) removed from Left Bronchus of same patient as Fig. 3

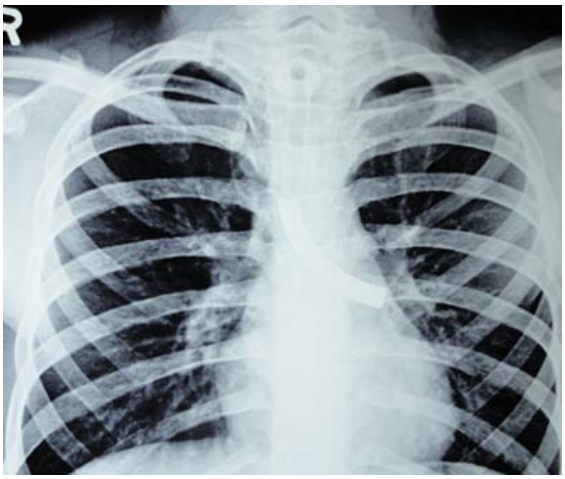


Figure 5: Broken part of Outer Tube of Metal Trachesostomy tube seen in Left Main Bronchus on X-Ray Chest

Licensed Under Creative Commons Attribution CC BY