

Foreign Bodies of Tracheo-bronchial tree: A Retrospective Study

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ABSTRACT

Introduction: Foreign body aspiration is a life-threatening pediatric emergency which may sometimes results in sudden death. Children may present with choking episode, coughing, wheezing or stridor. Early diagnosis and prompt intervention saves the life and helps in avoiding pulmonary complications. The objective of this work was to find the most common type of tracheo-bronchial foreign body, associated clinical signs, radiological findings, locations and complications encountered and the intervention needed for removal and to resolve complications.

Material and Methods: A retrospective study of 78 patients admitted during the period of June 2014 – June 2016 in BLDE University's Shri. B. M. Patil Medical College Hospital and Research Centre, Vijayapura, with suspicion of foreign body in the tracheo-bronchial tree, who underwent bronchoscopy and foreign body was retrieved and analysed.

Result: The most common age group for foreign body in tracheo-bronchial tree was 6 months to 2 years. The most common type of foreign body was seeds, especially peanuts. Definitive history of foreign body aspiration was given by 62% of the cases. The most predominant symptoms include choking episode with cough following ingestion of the foreign body. The complications ranged from minor injuries in the oral cavity to dreaded complications like pulmonary oedema, cardiac arrest and death.

Conclusion: Diagnosis of foreign body in tracheo-bronchial tree requires high degree of suspicion and correlation of history and clinical findings with radiographs. Prompt intervention by an experienced surgical and anesthetic team helps in successful retrieval of the foreign body with less incidence of complications.

Keywords: Foreign Bodies, Tracheo-bronchial tree

INTRODUCTION

Foreign body aspiration is a life-threatening pediatric emergency which may sometimes results in sudden death. It is a leading cause of sudden death in children under the age of 6 years.¹ Young children, due to their poor chewing ability, are more prone to aspiration while eating, crying or playing. Children may present with choking episode, coughing, wheezing or stridor. Many of these children are treated as asthmatics. Many a times even a history of "choking" has been neglected at the first medical consultation.² Early diagnosis and prompt intervention saves the life and helps in avoiding pulmonary complications. The removal of a foreign body from the respiratory tract usually leads to a rapid recovery. The objective of this work was to find the most common type of tracheo-bronchial foreign body, associated clinical signs, radiological findings, locations, complications encountered and the intervention needed for removal and to resolve complications.

MATERIAL AND METHODS

A retrospective study of 78 patients admitted during the period of June 2014 – June 2016 in Shri. B. M. Patil Medical College

Hospital and Research Centre, BLDE University, Vijayapura, with suspicion of foreign body in the tracheo-bronchial tree, who underwent bronchoscopy and foreign body was retrieved. Informed consents were taken from the patient or patient's parents/relatives at the time of admission for studies and research purposes without revealing identity. Data was collected from the Medical Records Department of the hospital and it was analyzed. Inclusion criteria were positive foreign body in bronchoscopy and patients who given consent for study. Exclusion criteria were negative foreign body in bronchoscopy.

STATISTICAL ANALYSIS

All characteristics were summarized descriptively. For categorical data, the number and percentage were used in the data summaries.

RESULTS

Age group

The most common age group for foreign body in tracheo-bronchial tree was 6 months to 2 years. More than 50% of the cases were in this age group (table-1).

Type of foreign body

The most common type of foreign body was seeds, especially peanuts. The other identified foreign bodies include plastic foreign bodies like plastic whistle, beads, plastic wrappers, and metallic foreign bodies like fractured tracheostomy tube, parts of dental prosthesis and pins. Three organic foreign bodies could not be correctly identified after removal due to delay in presentation (table-2).

History of foreign body

Definitive history of foreign body aspiration was given by 62% of the cases (table-3).

Predominant symptoms

The most predominant symptoms include choking episode with cough following ingestion of the foreign body. They may also present with symptoms like chronic cough, fever, breathlessness, wheezing and stridor. Around 5% of the cases

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were asymptomatic during their presentation (table-4).

Predominant sign

The most predominant sign was decreased air entry (table-5).

Radiographic findings.

The most common radiographic finding includes obstructive emphysema with or without shifting of mediastinum. The three metallic foreign bodies were visible in radiograph. The other common findings were atelectasis and consolidation of lungs. Around 15% of the cases had apparently normal looking roentgenograms (table-6).

Site of foreign body

The most common site of foreign body was right main bronchus, followed by left main bronchus and trachea (table-7).

Average time for removal

Most of the foreign bodies were retrieved in 10-20 minutes time. In around 15% of the cases, time taken to retrieve foreign body was more than 20 minutes (table-8).

Complications

The complications ranged from minor injuries in the oral cavity to dreaded complications like pulmonary oedema, cardiac arrest and death (table-9).

| Age | Number of cases | Percentage |
|--------------------|-----------------|------------|
| 6 months – 2 years | 45 | 57.70 |
| 2 – 4 years | 19 | 24.36 |
| 4 – 6 years | 5 | 6.41 |
| 6 – 8 years | 4 | 5.13 |
| 8 – 10 years | 2 | 2.56 |
| 10 – 20 years | 2 | 2.56 |
| >20 years | 1 | 1.28 |
| Total | 78 | 100 |

Table-1: Percentage distribution of Age among the patients

| Type of foreign body | Number of cases | Percentage | |
|---|--------------------|------------|-------|
| Seeds | Peanut | 52 | 66.67 |
| | Tamarind seed | 3 | 3.85 |
| | Custard apple seed | 1 | 1.28 |
| | Bengal gram | 5 | 6.41 |
| | Chikku seed | 1 | 1.28 |
| | Maize | 1 | 1.28 |
| Areca nut | 1 | 1.28 | |
| Plastic-whistle, bead, plastic wrapper | 5 | 6.41 | |
| Fractured metallic-tracheostomy tube, safety pin, dental prosthesis | 3 | 3.85 | |
| Stone piece | 1 | 1.28 | |
| Marble piece | 1 | 1.28 | |
| Rubber Toy wheel | 1 | 1.28 | |
| Unidentified | 3 | 3.85 | |
| Total | 78 | 100 | |

Table-2: Percentage distribution of type of foreign body

| History of foreign body | Number of Cases | Percentage |
|---------------------------|-----------------|------------|
| Definite positive history | 49 | 62.82 |
| Doubtful positive history | 11 | 14.10 |
| Negative history | 18 | 23.08 |
| Total | 78 | 100 |

Table-3: Percentage distribution of history among the patients

DISCUSSION

The most common age group for foreign body in tracheo-bronchial tree in our study was 6 months – 2 years (Table 1). In a study conducted by Shivakumar et al., it was found that children between 1 - 3 years were found to be vulnerable for aspiration.³ As the children of this age group lacks molar tooth,

| Predominant symptoms | Number of cases | Percentage |
|----------------------|-----------------|------------|
| Chocking episode | 36 | 46.16 |
| Chronic cough | 10 | 12.82 |
| Fever | 9 | 11.54 |
| Breathlessness | 8 | 10.26 |
| Wheezing | 8 | 10.26 |
| Stridor | 3 | 3.85 |
| No symptoms | 4 | 5.13 |
| Total | 78 | 100 |

Table-4: Percentage distribution of predominant symptoms among the patients

| Sign | Number of cases | Percentage |
|---------------------|-----------------|------------|
| Decreased air entry | 59 | 75.64 |
| Ronchi | 16 | 20.51 |
| Tracheal flutter | 3 | 3.85 |
| Total | 78 | 100 |

Table-5: Percentage distribution of predominant signs among the patients

| Radiographic findings | Number of cases | Percentage |
|-----------------------|-----------------|------------|
| Obstructive emphysema | 46 | 58.97 |
| Visible foreign body | 3 | 3.85 |
| Atelectasis | 9 | 11.54 |
| Consolidation | 8 | 10.26 |
| Normal radiograph | 12 | 15.38 |
| Total | 78 | 100 |

Table-6: Percentage distribution of radiographic findings among the patients

| Site of foreign body | Number | Percentage |
|----------------------|--------|------------|
| Right main bronchus | 43 | 55.13 |
| Left main bronchus | 32 | 41.02 |
| Trachea | 3 | 3.85 |
| Total | 78 | 100 |

Table-7: Percentage distribution of site of foreign body

| Average time for removal | Number of cases | Percentage |
|--------------------------|-----------------|------------|
| <10 min | 18 | 23.08 |
| 10 – 20 min | 48 | 61.54 |
| >20 min | 12 | 15.38 |
| Total | 78 | 100 |

Table-8: Percentage distribution of average time for removal of foreign body

| Complication | Number |
|----------------------|--------|
| Oral cavity injuries | 4 |
| Pulmonary oedema | 3 |
| Cardiac arrest | 3 |
| Death | 1 |

Table-9: Complications encountered by the patients during bronchoscopy

the chewing will be inadequate making them vulnerable to aspiration. More than half the patients were under two years of age and more than 90% were under the age of eight years. Children lacks adequate control of deglutition and they tend to involve in physical activities like running and playing together with talking and crying while eating are the risk factors.^{4,5}

More than 80% of tracheo-bronchial foreign bodies were organic in nature (Table 2). Seeds such as peanuts, bengal gram, custard apple seed and maize were common among children. Customs and regional food habits influence the type of foreign bodies which are aspirated.⁶ Non organic foreign bodies were mostly plastic and metallic ones. We have also come across some unusual metallic foreign bodies like fractured tracheostomy tube.

A definite positive history of foreign body was given by 62.82% of the cases (Table 3). Mothers were the most reliable informants. The most predominant symptoms include a choking episode with a bout of cough following ingestion of the foreign body (Table 4). This is often referred as penetration syndrome.⁷ The physical examination usually revealed reduced respiratory sounds on the affected side. They may also present with symptoms like chronic cough, fever, breathlessness, wheezing and stridor. Around 5% of the cases were asymptomatic during their presentation. The most predominant sign was decreased air entry (Table 5).

The most common radiographic finding includes obstructive emphysema with or without shifting of mediastinum (Table 6). The patients who presented late often showed atelectasis in the X-ray. Around 15% of the cases did not show any abnormality in the radiograph. Radiographs may be deceiving in cases of radiolucent foreign body and short interval between aspiration and time of presentation, as the radiological signs may not have developed. Around 80% of children with laryngotracheal foreign bodies and 30-50% of children with bronchial foreign bodies were reported with a normal chest radiograph, in various studies.⁸ Thus, an essentially normal radiograph doesn't rule out a foreign body. The early diagnosis largely depends on doctor to whom the child first presents, as the clinical history and physical examination are the most important elements to make the diagnosis. Many a times these children were treated as bronchial asthma or pneumonia in the first consultation. A foreign body should always be suspected in children with repeated or non-resolving pneumonia. Sometimes foreign bodies were suspected after multiple consultations. A positive history of choking with a bout of cough, positive finding on clinical examination with or without positive radiological finding should be taken as foreign body aspiration unless and until disproved.

All the patients were subjected to rigid bronchoscopy under general anaesthesia. We used appropriate size ventilating bronchoscope and a wide variety of bronchoscopy forceps to retrieve the foreign body. The most common site of foreign body was the right bronchus owing to its more vertical position.⁹ The next common site was left bronchus and least in trachea (Table 7). Even though incidence of tracheal foreign body is less, these cases require immediate attention and prompt intervention.

The success of retrieval of foreign body depends on a number of factors like delay in presentation, use of appropriate size of bronchoscope and bronchoscopy forceps, size and type of foreign body, experience of the surgeon and anesthetic team.

Most of the foreign bodies, i.e. around 84% of them were removed in less than 20 minutes and were associated with lesser incidence of complications (Table 8). When the delay to retrieve the foreign body was more than 20 minutes, the patients tend to develop complications like pulmonary oedema for which positive pressure ventilation have to be initiated (Table 9). If the surgeon could not retrieve the foreign body even after 30 minutes, it is better to abandon the procedure and take the patient for the procedure on a later date. Hypoxia and reflex vagal stimulation leads to hypoxia and cardiac arrest. Therefore, throughout the procedure it is mandatory to maintain adequate ventilation. Three of our cases went in for cardiac arrest out of which we could revive two and we lost one patient in spite of all our attempts. After the retrieval of the foreign body, a second look is mandatory to rule out left over pieces of the foreign body. A check of the complete bronchial tree and flushing with physiological solution is important as some authors have found that it helps in removing residual foreign body after bronchoscopy in 26% of patients.¹⁰

CONCLUSION

Foreign body in the tracheo-bronchial tree is an emergency and diagnosis of which require high degree of suspicion and correlation of history and clinical findings with radiographs. Prompt intervention by an experienced surgical and anesthetic team helps in successful retrieval of the foreign body with less incidence of complications.

REFERENCES

1. Ross AHM, McCormack RJM. Foreign body inhalation. *JR Coll Surg Eding.* 1980;25:104-09.
2. Bittencourt PFS, Camargos PAM, Scheinmann P, Blic J. Foreign body aspiration: clinical, radiological findings and factors associated with its late removal. *Int J Pediatr Otorhinolaryngol.* 2006;70:879-84.
3. Shivakumar AM, Naik AS, Prashanth KB, Shetty KD, Praveen DS. Tracheobronchial foreign bodies. *Indian J Paediatr.* 2003;70:793-97.
4. Pyman C. Inhaled foreign bodies in childhood: A review of 230 cases. *Med J Aust.* 1975;1:62-69.
5. Dandilidis J, Symeonidis B, Triaridis K, Kouloulas A. Foreign body in airways: A review of 90 cases. *Arch Otolaryngol Head Neck Surg.* 1977;103:62-69.
6. Cataneo AJM, Cataneo DC, Ruiz Jr RL. Management of tracheobronchial foreign body in children. *Pediatr Surg Int.* 2008;24:151-56.
7. Baharloo F, Veyckemans F, Francis C, Biettlot MP, Rodenstein DO. Tracheobronchial foreign bodies: Presentation and Management in children and adults. *CHEST.* 1999;115:1357-62.
8. Assefa D, Amin N, Stringel G, et al. Use of decubitus radiographs in the diagnosis of foreign body aspiration in young children. *Pediatr Emerg Care.* 2007;23:154-7.
9. Wiseman NE. The diagnosis of foreign body aspiration in childhood. *J Pediatr Surg.* 1984;19:531-35.
10. Wood RE, Gauderer MWL. Flexible fiberoptic bronchoscopy in the management of tracheobronchial foreign bodies in children: the value of a combined approach with open tube bronchoscopy. *J Pediatr Surg.* 1984;19:693-98.

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