Airway foreign bodies in children: experience of 132 cases

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ABSTRACT

Introduction: Foreign body inhalation in children is not uncommon, and may escape notice by the parents as well as the physicians, because of the lack of knowledge of the exact history and inconclusive radiographical findings.

Methods: A retrospective analysis of airway foreign bodies in 132 children (80 males and 52 females) over a period of 20 years was conducted. Rigid bronchoscopy under general anaesthesia was done in 129 cases.

Results: The majority of patients (46 percent) were younger than three years of age. Duration of symptoms varied from less than six hours to three months. Definitive history of foreign body inhalation or sudden choking episodes were present in 71 children. The foreign body was successfully removed in 93.2 percent of the cases. Peanuts were the commonest foreign body. Foreign bodies were found in the right main bronchus in 62 cases, in the left main bronchus in 46 cases, and at vocal cord level in 7 cases. Chest radiographs were normal in 46 cases.

Conclusion: Rigid bronchoscopy usually gives good results in detecting airway foreign bodies. It should be performed at the earliest opportunity even when the definitive history is not forthcoming and the chest radiograph is inconclusive.

Keywords: airway obstruction, aspiration, bronchoscopy, foreign body aspiration

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INTRODUCTION

Aspirated foreign bodies are responsible for a significant amount of morbidity and mortality in children despite the improvement in anaesthetic and endoscopical techniques. The sudden aspiration of a foreign object into the airway may result in acute respiratory distress, chronic pulmonary infections, atelectasis, and even death.

Table I. Age of children with foreign bodies in the airway.

Age (years)	No. of patients	Percentage (%)
< 1	6	4.5
1–3	55	41.6
4–6	22	16.9
7–10	25	18.9
> 10	24	18.1

Table II. Duration of symptoms in children with foreign bodies in the airway.

Symptom duration	No. of patients	Percentage (%)
< 6 hours	4	3.0
6–12 hours	18	13.6
12–24 hours	16	12.2
1–3 days	56	42.4
3–7 days	18	13.6
1–4 weeks	13	9.9
4–12 weeks	7	5.3

As they can mimic other pathological conditions such as croup, pneumonia and asthma, it is sometimes mismanaged. The foreign bodies are best managed by rigid bronchoscopy which, in experienced hands, is very simple, almost free of complications and usually successful. A retrospective review of our 20-year experience of 132 cases of foreign bodies in the airway in children was undertaken and is being presented to share our experience.

METHODS

The retrospective study was carried out in 132 children who were admitted to the otolaryngology department of Post Graduate Institute of Medical Sciences, Rohtak, India, during a period of 20 years from July 1981 to July 2001, for evaluation of foreign body aspiration. 80 of these patients were male and 52 were female. Their ages ranged from six months to 14 years, with 46% being below the age of three years (Table I). Duration of symptoms ranged from less than six hours to three months. 42.4% of patients had symptoms for 24-72 hours, and 15.9% had symptoms of more than one week (Table II).

Table III. Types of airway foreign bodies in children.

Foreign body	No. of patients	Percentage (%)
Peanut	69	52.3
Food material	16	12.2
Seed	7	5.3
Bone	2	1.5
Plastic object	20	15.1
Metallic object	6	4.5
Stone	1	0.8
Tablet	2	1.5
No foreign body detected	4	3.0

Table IV. Radiological signs in airway foreign bodies in children.

Radiological sign	No. of patients	Percentage (%)
Obstructive emphysema	37	28.0
Foreign body visualised	8	6.1
Atelectasis	16	12.2
Pneumonia	15	11.3
Normal	56	42.4

A definitive history of foreign body inhalation or a sudden choking episode was present in 71 (53.8%) patients. All of them developed symptoms of wheeze and cough later on. In the remaining 61 (46.2%) patients, there was no definitive history of foreign body inhalation; 46 of them presented with difficulty in respiration and cough and the remaining 15 were referred from paediatricians for non-resolving or recurrent segmental pneumonias. Stridor was present in 14 cases.

All the patients underwent radiological evaluation, i.e. radiographs of the neck and chest. Three patients presented with obstructed conditions and could not be resuscitated. In 129 cases, bronchoscopy was carried out under general anaesthesia. An inhalational agent was administered first by mask, and airway control was then shifted to a ventilating rigid bronchoscope. In 118 cases, bronchoscopy was delayed until diagnostic evaluation and fasting was complete for general anaesthesia. However, in 11 cases, the patients were in acute distress and bronchoscopy was done on an urgent basis. In 14 patients, bronchoscopy was required more than once. Postoperatively, all the children were treated with bronchodilators and steroids, along with antibiotics.

RESULTS

Out of the 132 patients, foreign bodies were successfully removed in 123 cases (93.2%). In two cases, foreign bodies were removed via thoracotomy. In four cases, mucus plug was found to be the offending endogenous foreign body. A wide variety of foreign bodies were removed, with peanuts being the commonest foreign body, comprising 69 cases (Table III). Foreign bodies were found in the right main bronchus in 62 cases and in the left main bronchus in 46 cases. In seven cases, the foreign body was at the vocal cord level and in four cases each, at the subglottis and trachea, respectively.

On clinical examination, signs of rhonchi, decreased breath sounds and intercostal retraction were present on the side involved, in almost all the cases. However, radiological signs were positive in 76 (57.6%) patients only (Table IV). No serious postoperative complication occurred, except for atelectasis in 11 cases (8.3%). All these patients responded well to physiotherapy.

DISCUSSION

The first systematic or elaborate study of foreign bodies in airway was attempted by Gross in his publication "A practical treatise on foreign bodies in the air passages" in 1854.[1] He emphasised the importance of clinical history, especially the first paroxysm, notably cough and a severe suffocation which occurred with the aspiration of foreign object. In our series, only 56.8% of the cases had such a definitive history of foreign body inhalation. There may be a symptomless period after first paroxysm, which may vary in duration from few days to even months. However, subsequent wheezing, cough, choking and sudden onset of asthma point towards a possible foreign body aspiration. Recurrent or non-resolving pneumonia also indicates possibility of a foreign body aspiration. In children, aspiration of foreign bodies lodged high in the tracheal airway mimics viral croup. However, recurrence of symptoms like stridor and wheezing after one successful treatment with antibiotics and steroids should alert one of a possible foreign body.[2]

Our study showed a male predominance, which is in agreement with many other studies.[3-7] The number of foreign bodies in the right main bronchus (62) was more, as reported earlier.[8] This is explained by the anatomical features of the right main bronchus, i.e. it is wider in diameter, shorter in length and has more direct extension of the trachea than the left bronchus.[6]

We observed that the peanut is the commonest foreign body, which is the same observation made by almost all the previous studies,[4,5] especially vegetable foreign bodies,[6] indicating that parents should be educated to abstain from feeding nuts and seeds to young children who do not have premolars or molars and cannot grind smaller inhalable pieces effectively. Furthermore, they have an immature protective cough

reflex, compared to adults, as children have narrower airways. Hence, morbidity and mortality are higher in children.[9] The propensity of finding a peanut in airways of children is probably due to its availability and affordability as compared to other nuts in India.

Recent studies have shown that magnetic resonance imaging with T1-weighted images to be useful for the definitive diagnosis and location of peanut fragments in the lower airway, because it appears as a high intensity signal surrounded by the low intensity lung tissue.[10,11] The second most common type of foreign body was plastic objects, especially small whistles which are present in toys and easily put in the mouth by children.

Our study showed positive radiological findings in only 57.6% of cases, as compared to 62% each in two recent studies.[12,13] This can be improved if chest radiographs are taken in full expiration and inspiration. Flouroscopy can still improve upon this by showing air trapping or mediastinal shift, and can increase the ratio of accurate and early diagnosis.[12-14] Obstructive emphysema was the most common radiological sign. This is in agreement with various studies.[3,12,13]

Killian was the first person to remove a foreign body from an air passage in 1898. Later on, Einhorn, Jackson, Ingels and Mashu improved the instrumentation and brought it to its present high state of perfection.[15] In the initial years, bronchoscopy was performed without anaesthesia, but nowadays, general anaesthesia has made bronchoscopy much easier and safer. Tracheal and laryngeal foreign bodies almost completely occluding the lumen are removed after full oxygenation and without muscle relaxants. However, general anaesthesia is not contraindicated as previously believed.[4]

Urgent bronchoscopy is usually needed only in cases when severe respiratory distress is present with stridor, and for foreign bodies in the larynx or trachea. In 11 of our cases, we needed urgent bronchoscopy or laryngoscopy. Duration of symptoms after the first episode of choking was not found to affect the final outcome in the present series, as the majority of our patients (85%) presented within a week, and only 5% were of a duration between 4–12 weeks, as also reported by Gurpinar et al.[7] 20 children who presented between 4–12 weeks were the ones associated with atelectasis and/or pneumonia which was managed successfully. However, major complications are related to size, location, type and duration of the foreign body,[16,17] and are associated with considerable morbidity. Early diagnosis remains the key to successful and uncomplicated management.

Repeat bronchoscopy is needed only if the first bronchoscopy is unsuccessful or when granulomatous reaction is seen at the time of removal of the foreign body or when there is persistent pneumonia. Postoperative corticosteroids may be useful, especially in cases which require a second procedure, to decrease the oedema and erythema caused by the initial procedure.[17,18]

There was a maxim among paediatric bronchoscopists that the rigid bronchoscope is better for the extraction of foreign bodies because of its ability to control and ventilate the airway, while removing the offending foreign body. However, flexible bronchoscopes are now being used by many bronchoscopists with very good results and this has been found to be more useful in removing the peripheral or distal foreign bodies,[5,19] especially if aided by cinefluoroscopy. Fibreoptic bronchoscopy may be easy, better and safe, especially in adults.[20] Video imaging can provide a clear and magnified view and reduces the risk of residual foreign bodies and avoidance of repeat bronchoscopy.[21]

Although serious complications, such as mediastinal emphysema, atelectasis, pneumothorax, tracheoesophageal fistula and bronchiectasis, have been reported after bronchoscopy,[22] in our series, only atelectasis was observed in 11 cases, which r esponded well to postoperative physiotherapy. In conclusion, foreign body inhalation is not uncommon in children and rigid bronchoscopy usually gives good results. Bronchoscopy should be performed at the earliest opportunity when there is suspicion of foreign body inhalation, even in the case of a negative chest radiograph.

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