Airway foreign bodies in children: experience of 132 cases

Yadav S P S, Singh J, Aggarwal N, Goel A

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

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.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>No. of patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>6</td>
<td>4.5</td>
</tr>
<tr>
<td>1–3</td>
<td>55</td>
<td>41.6</td>
</tr>
<tr>
<td>4–6</td>
<td>22</td>
<td>16.9</td>
</tr>
<tr>
<td>7–10</td>
<td>25</td>
<td>18.9</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>24</td>
<td>18.1</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Symptom duration</th>
<th>No. of patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6 hours</td>
<td>4</td>
<td>3.0</td>
</tr>
<tr>
<td>6–12 hours</td>
<td>18</td>
<td>13.6</td>
</tr>
<tr>
<td>12–24 hours</td>
<td>16</td>
<td>12.2</td>
</tr>
<tr>
<td>1–3 days</td>
<td>56</td>
<td>42.4</td>
</tr>
<tr>
<td>3–7 days</td>
<td>18</td>
<td>13.6</td>
</tr>
<tr>
<td>1–4 weeks</td>
<td>13</td>
<td>9.9</td>
</tr>
<tr>
<td>4–12 weeks</td>
<td>7</td>
<td>5.3</td>
</tr>
</tbody>
</table>
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. 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.

Our study showed a male predominance, which is in agreement with many other studies. The number of foreign bodies in the right main bronchus (62) was more, as reported earlier. 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 tracheal airway than the left bronchus.

We observed that the peanut is the commonest foreign body, which is the same observation made by almost all the previous studies, especially vegetable foreign bodies, 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

| 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           |
reaction is seen at the time of removal of the foreign body, to size, location, type and duration of the foreign body, and uncomplicated management. Early diagnosis remains the key to successful 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.\(^{(16)}\) 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 responded 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.

**ACKNOWLEDGEMENT**

We thankfully acknowledge the permission granted by the Medical Superintendent for use of the hospital records.

**REFERENCES**