The value of chest x-ray in foreign body aspiration of children

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Abstract

Introduction: Foreign body aspiration (FBA) is a common cause of respiratory distress in children. Delay in diagnosis and treatment can cause serious complication especially chronic pneumonia. The aim of this study was evaluation of plain chest X-Ray (CXR) as the first and available imaging modality in FBA of children.

Materials and Methods: A retrospective analysis was conducted on the records of pediatric patients less than 18 years of age with the discharge diagnosis of FBA from 1999 to 2003 at the Imam Reza Hospital (a large tertiary center in Khorasan province).

Results: From 140 patients with FBA 87 (62%) were male. The mean age was 48 months. The most common clinical findings were: history of choking (77%), decreased breath sounds (42%), wheezing (38%), cough (20%), respiratory distress (15.5%) and fever. CXR was normal in 47% of patients with a sensitivity about 64%. Air trapping (Emphysema) was most common radiological findings (24.5%). Other radiological finding were, consolidations (10.5%), atelectasis (6.5%) and opaque foreign bodies (6.5%). In all cases except four cases, aspirated foreign bodies were food materials and watermelon seeds were the commonest one (40%). Bronchoscopic removal of foreign body was done successfully in 133 patients (95%).

Conclusion: Although FBA in children diagnosed by history, physical examination and radiographic findings, but this findings may be misleading. Negative CXR should not preclude diagnosis of FBA in children with a strong history of FBA, and early bronchoscopic examination will be safe and life saving.

Key words: Foreign body aspiration, Chest X-Ray, Children

Introduction:

Foreign body aspiration (FBA) can be a life threatening emergency requiring immediate intervention. Foreign body aspiration typically occurs in children and manifests as obstructive lobar or segmental over inflation or atelectasis in CXR. Although radiographic studies are often obtained, decision for surgical intervention is usually based on a suspicious history and physical examination. The aim of this study was evaluation of plain CXR finding as the first and available imaging modality in FBA of children.

Materials and Methods

Form 1998 to 2003 the medical records of 140 children less than 18 years old age with discharge diagnosis of FBA at Imam Reza Hospital a large tertiary referral center were reviewed. Patients with nasopharyngeal foreign bodies were excluded. Clinical and, radiological findings analyzed statistically.
Results

From 140 patients 87 (62%) were male and 53 (%38) were female. The mean age was 48 months and the peak incidence of aspiration occurred during 1-6 years, accounting for 82.2% of the total cases. The sign and symptoms are outlined in (Table 1).

<table>
<thead>
<tr>
<th>Symptoms and Signs</th>
<th>Silva AB (1)* No (%)</th>
<th>Baharloo (9)* No (%)</th>
<th>Present Study No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choking</td>
<td>82(86)</td>
<td>48(49)</td>
<td>109(77)</td>
</tr>
<tr>
<td>Wheezing</td>
<td>76(81.7)</td>
<td>25(26)</td>
<td>54(38.6)</td>
</tr>
<tr>
<td>Decreased breathing Sounds</td>
<td>47(50)</td>
<td>25(26)</td>
<td>59(42)</td>
</tr>
<tr>
<td>Cough</td>
<td>39(42)</td>
<td>36(37)</td>
<td>98(69)</td>
</tr>
<tr>
<td>Respiratory Distress</td>
<td>17(18)</td>
<td>-----</td>
<td>7(15.4)</td>
</tr>
<tr>
<td>Fever</td>
<td>16(17)</td>
<td>30(31)</td>
<td>7(15.4)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>14(15)</td>
<td>-----</td>
<td>6(4.6)</td>
</tr>
<tr>
<td>Stridor</td>
<td>7(7.5)</td>
<td>-----</td>
<td>3(6.6)</td>
</tr>
</tbody>
</table>

*Reference No

The most frequent symptom was sudden onset of choking as seen in 77% of patients. Radiographic findings are shown in (Table 2). Foreign body was food materials in all except four cases which usually are nonopaque. Nearly half of the organic aspirated foreign bodies were watermelon seeds.

<table>
<thead>
<tr>
<th>Visible foreign body</th>
<th>Baharloo(9)* No (%)</th>
<th>Tokar (5)* No (%)</th>
<th>MU (11)* No (%)</th>
<th>Present study No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air trapping</td>
<td>49(64)</td>
<td>68(82)</td>
<td>77(41)</td>
<td>34(24.5)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>10(13)</td>
<td>34(69)</td>
<td>43(24)</td>
<td>13(10.5)</td>
</tr>
<tr>
<td>Atelectasis</td>
<td>11(4)</td>
<td>37(67)</td>
<td>33(18)</td>
<td>9(6.4)</td>
</tr>
<tr>
<td>Normal CXR</td>
<td>9(12)</td>
<td>51(68)</td>
<td>29(14)</td>
<td>66(47.1)</td>
</tr>
</tbody>
</table>

The main sites of foreign body was right bronchus in (38.6%), left bronchus in (22%), and carina in (23.6%). Frothy two percent of the patients presented immediately, that is within 24 hours after aspiration. In 133 patients (95%), the foreign body removed successfully under general anesthesia using rigid bronchoscope. Complication was seen in 5.7% of patients, include cardiac arrest (1), laryngospasm (5), pneumothorax (1) and pneumomediastinum (1). The mean of hospital stay was 2 days and mortality rate was 2.9%.

Discussion

Most tracheobronchial foreign bodies in children are food materials which are radiolucent, so accurate diagnosis of such foreign bodies is not always easy. Children may present without any history of aspiration or a atypical history with nonspecific symptoms. Accurate history and a high index of suspicion are needed to prevent delayed diagnosis and the complications (1-4).
The most common signs and symptoms of foreign body aspiration are choking, coughing, wheezing and decreased breathing sounds. (5,6). The history of choking crisis showed sensitivity and specificity of 97% and 93% respectively. Other findings such as radiography has a high sensitivity (85%) but low specificity (9%).

We found that of all signs and symptoms, the most predictive one is choking history and radiologic findings with a sensitivity of 81% and 64% respectively.

Radio-opacity of aspirated foreign bodies prevent misinterpretation of the symptoms and provides an early and accurate diagnosis. As we determined in our study, most aspirated foreign bodies were radiolucent, and only 5.7% of foreign bodies were opaque.

In children younger than 3 years, 80% of airway foreign bodies was food materials or other radiolucent items (8,9). Unilateral obstructive emphysema is the typical indirect radiological sign of radiolucent objects (1,6,9, 10, 12). In our study the most significant indirect radiological finding was emphysema (24.5%) (figure 1, 2).

Fig 1: A chest radiograph of a 5 years old girl with persisting cough demonstrates left lung air trapping.

Fig 2: Left lateral decubitus chest radiograph demonstrates failure of mediastinal shift. A watermelon seed was found in left main stem bronchus during bronchoscopy.

While emphysema and hyperlucent lung observed in early stage of foreign bodies, atelectasis or consolidation indicates fairly advanced stage (13) (figure 3).

Fig 3: A 4 years old boy presenting by abdominal pain and respiratory distress. Atelectasis of the lower right lung is noted. A watermelon seed was found in the right mainstem bronchus during bronchoscopy.

Plain chest radiography showed atelectasis in 18% of patients with foreign body aspiration (11). In present study atelectasis was determined in 6.5% of the patients. Atelectasis is more common in the adults (9).
From seventy four of the cases with non opaque foreign bodies, twenty three patients had normal radiographs (14). The proportion of normal radiographs reported in the literature varies from 8% to more than 80%, depending on the study and location of foreign body (9).

In present study 66 patients (47%) had normal radiographs. So if the clinician only rust the radiological finding and does not consider an early bronchoscopy in patients with strong history, the diagnosis can be delayed. This is important, because the longer a foreign body is left in situ, the grater the inflammation and the likelihood of complications. If an expiratory film can not be obtained due to lack of cooperation or negative radiological finding, the fluoroscopy may be helpful. Although CT Scan occasionally demonstrates an opacity not visualized on the plain film, it should not be considered as one of the initial diagnostic methods for foreign body aspiration (10). Computerized tomography (CT) scanning has been help full in child whom all other modalities, including surgical exploration, had failed to localized a foreign body. Combining our experience with that in literature, convincing history and plain chest radiography are two main criteria for the diagnosis of FBA Rigid bronchoscopy under general anesthesia was preferred method for removal of aspirated foreign body. Complications of bronchoscopy for foreign body aspiration are uncommon but occur even in experienced hands. In one study bronchoscopy was succeed in 558(99%) of children life threatening complication occurred in 21 (4%) and death in 5 patient (0.8%).

In present study bronchoscopic removal of foreign bodies was succeed in 133 (95%) patients and the life threatening complication occurred in 8 (5.7%) patients. There were 2 (9%) deaths.

**Conclusion**

Children with foreign body aspiration may present with atypical misleading history, clinical and radiological findings. History and plain chest radiography are two main criteria for the diagnosis of FBA. Regardless of radiological findings, when foreign body aspiration is suspected in a patient with a history of choking, a transient cyanosis and coughing, early bronchoscopic examination should be considered. Negative radiography and fluoroscopy should not preclude bronchoscopy in patients with a strongly history of foreign body aspiration.

**Acknowledgements**

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خلاصه

رادیوگرافی ساده قفسه صدري در آسیپراسیون جسم خارجی کودکان

درک هسته منطقه مقدام، دکتر محسن صداقی، دکتر صادق پواموردی

مقدمه: آسیپراسیون جسم خارجی یک علت شایع دیستریس تنفسی در کودکان است. تا کنون در تحقیق و درمان آن متوقف

منجر به عوارض جدی به ویژه آسیپراسیون جدا شده، هنر این پیشنهاد ارزیابی نش رادیوگرافی ساده قفسه صدري در تشخیص

آسیپراسیون جسم خارجی به عنوان یک کمک اولیه و در دسترس است.

روش کار: این پیشنهاد با صورت گذشته نگر طالس هال 3-3799 در بیماران امام رضا (ع) وابسته به آن مشاهده شد. مقایسه با تحقیقات دیگر

مشه قفذ و نتایج. اطلاعات موجود از بورونه بیماران کمتر از 18 سال که با تشخیص آسیپراسیون جسم خارجی ترسیم شده

بودند، استخراج و یافته های حاصل به مطالعات مشابه مقایسه و تجزیه و تحلیل آماری گردید.

نتایج: از مجموع 40 بیمار (28+12) مذکر بودند. متوسط سن بیماران 48.3 ماه بود. شاخص ترتیب پایه های بلوچی عبارت

بودند از شرک حلال (36.27%) کاهش صمامی فنی (46%) خس سنس سیس (26.2%) دیستریس تنفسی (10.5/) و پایه های رادیوگرافی قفسه صدري در 27 موارد طبیعی و حساسیت تشخیصی 92/9% بود. پروپاپل شاخص ترتیب پایه های رادیوگرافی بود (26.3/2%) سایر پایه های رادیوگرافی به ترتیب قانون اقرار بودند. از کدروت ریوی (51.1/2%) انتقالی در

تکیه گیری: اگر به تشخیص جسم خارجی کودکان در شرح حال، معاونت فیزیکی و پاته های رادیولوژیک مفید می گردد. نتیجه این پیشنهاد، چه درمان کودکان میریباشد. رادیوگرافی فنی قفسه صدري طبیعی به ویژه در مواردی که شرح حال قلیاقی به تغییر

تشخیص است و یا نیاز به کار گذاشتن تشخیص آسیپراسیون جسم خارجی گردد و پروتوکول های روش و یا تجربه نهایت

واژه های کلیدی: آسیپراسیون جسم خارجی، رادیوگرافی قفسه صدري، کودکان

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