An Uncommon Presentation of a Common Problem

Presented By: Dr Vivekanand V V MD

Clinical Coordinators:

Dr S Thangavelu MD., DNB., MRCP.,
Dr K Sasidaran MD., FPN., FPCC., DM.,
Mehta Children’s Hospital, Chennai.
A - 10 years old boy

Wt: 21 Kg

Total duration of hospital stay: 15 days

Total duration of PCCU stay: 4 days

Time period: 6.08.2013 – 14.08.2013
Status Epilepticus
Ventilated/AED
Admitted in referring hospital

No further seizure

Extubated on day 4
Remained stable for 6hrs
Following physiotherapy became hypoxic
Reintubated for Left lung collapse

CXR - Obstructive emphysema Right side

Transferred to MCH PCCU

30.7 01.08 02.08 03.08 04.08 05.08
D1  D2  D3  D4  D5  D6
Other history pertinent to present illness:

- Normal development and scholastic activities prior to onset of current illness
- No h/o fever, cough, cold or hurried respiration
- No h/o recent vaccination; Immunized for age; No h/o contact with TB
- No h/s/o Accidental poisoning OR Toxin exposure.
- No h/o any seizures in the past
- No h/o recurrent LRI in the recent past.
- No h/o any wheezing episodes in the past
Endotracheally Intubated

1. Respiratory Rate: 36/min
2. Efforts: Increased
3. Air Entry: Right side air entry reduced
4. Auscultation: Bilateral Rales +
5. SpO₂ in 50% FiO₂: 95%

1. Heart Rate: 110/ min
2. CFT: N  BP: 110 / 70 mmHg
3. Central Pulse: Good
4. Peripheral Pulse: Good
5. Skin Temp: Warm
6. ECG: Rhythm Normal

1. GCS: Pharmacologically sedated
2. Pupil Size: 3mm Reaction: PERRL
3. Motor Activity: Normal & Symmetrical
4. Blood Sugar: normal

1. Temp: Afebrile
2. Color: Normal
3. Surface findings: nil
Physiological Status at Admission

Endotracheally Intubated
Adequately Sedated
On Invasive Ventilation PRVC mode

Still.... Respiratory Distress +

When off sedation – Sensorium Normal
No further Seizure Recurrence

No e/o Primary or Secondary Brain Dysfunction though the primary diagnosis is Status Epilepticus

Are we dealing with HAI worsening the Primary Disease?
Investigational work up...

<table>
<thead>
<tr>
<th>LFT</th>
<th>CBC</th>
<th>LYTES</th>
<th>RFT</th>
<th>COAGULATION</th>
<th>OTHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total bilirubin-0.4 mg/dl</td>
<td>Hb – 11.7</td>
<td>Na-129</td>
<td>Urea - 19</td>
<td>PT -12 s</td>
<td>CRP-4</td>
</tr>
<tr>
<td>AST-25</td>
<td>TLC – 15000</td>
<td>K- 3.7</td>
<td>Creatinine - 0.2</td>
<td>PTT – 15 s</td>
<td>Procalcitonin - 0.6</td>
</tr>
<tr>
<td>ALT -20</td>
<td>Poly-65% Lym-33%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALP 25</td>
<td>Platelet – 2L</td>
<td>CL-100</td>
<td></td>
<td>INR.0.88</td>
<td>Ca - 9 mg/dl</td>
</tr>
<tr>
<td>ALBUMIN- 3.6</td>
<td></td>
<td>HCO3-20</td>
<td></td>
<td></td>
<td>Mg -2.1</td>
</tr>
</tbody>
</table>

No evidence of Active Infection (HAI)

Do we need to think of an alternate diagnosis?
On reviewing the CXRs...

CXR SHOWING OBSTRUCTIVE EMPHYSEMA RT SIDE
CXR SHOWING RT SIDED PNEUMOTHORAX

RT SIDED PNEUMOTHORAX
RIGHT ICTD introduced - Pneumothorax drained
Post Extubation - Remained stable for 6 hours

Tried Chest Physiotherapy

Developed Features of Hypoxia

Reintubated and Ventilated
Worsening Lung condition....
History Reviewed...

“History of intake of a handful of groundnuts while playing, following which he developed intense choking and severe bouts of cough”

Tracheo-bronchial Foreign Body

Choking Crisis is also termed as **PENETRATION SYNDROME**
**Most Sensitive and Specific Clinical features were Choking and Witnessed Aspiration Episode**

**Tracheobronchial foreign body aspiration in children: how reliable are clinical and radiological signs in the diagnosis?**

Orji, F.T.*† & Akpeh, J.O.*


<table>
<thead>
<tr>
<th>Clinical features (n)</th>
<th>$\chi^2$-test</th>
<th>Multivariate</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (&gt;3 years)</td>
<td>0.60</td>
<td>0.60</td>
<td>27</td>
<td>72</td>
</tr>
<tr>
<td>Witnessed aspiration</td>
<td>0.001</td>
<td>0.02</td>
<td>54</td>
<td>89</td>
</tr>
<tr>
<td>Choking crisis</td>
<td>&lt;0.001</td>
<td>0.001</td>
<td>86</td>
<td>83</td>
</tr>
<tr>
<td>Paroxysm of cough</td>
<td>0.08</td>
<td>0.14</td>
<td>77</td>
<td>44</td>
</tr>
<tr>
<td>Dyspnoea</td>
<td>0.08</td>
<td>0.003</td>
<td>51</td>
<td>72</td>
</tr>
<tr>
<td>Wheezing</td>
<td>0.96</td>
<td>0.44</td>
<td>49</td>
<td>50</td>
</tr>
</tbody>
</table>
Diagnostic value of Various Investigations...

**REVIEW OF THE LITERATURE**

**Diagnostic value of various investigations in children with suspected foreign body aspiration**

Review


A. Hitter\(^a\,*\), E. Hullo\(^b\), C. Durand\(^c\), C.-A. Righini\(^a,d,e\)

- Chest Radiography
- Airway Fluoroscopy
- Multidetector CT Chest
- Flexible Bronchoscopy
- MR imaging
**Tracheobronchial foreign body aspiration in children: how reliable are clinical and radiological signs in the diagnosis?**

Orji, F.T.*†‡ & Akpeh, J.O.*


---

**Yield of CXR in Airway FBA**

<table>
<thead>
<tr>
<th>Radiological findings (%)</th>
<th>$\chi^2$-test</th>
<th>Multivariate</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiopaque FB</td>
<td>0.01</td>
<td>0.03</td>
<td>26</td>
<td>100</td>
</tr>
<tr>
<td>Atelectasis</td>
<td>0.42</td>
<td>0.10</td>
<td>6</td>
<td>88</td>
</tr>
<tr>
<td>Emphysema</td>
<td>0.11</td>
<td>0.18</td>
<td>13</td>
<td>72</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>0.09</td>
<td>0.48</td>
<td>29</td>
<td>50</td>
</tr>
</tbody>
</table>

Unfortunately...Non-Opaque Objects are the most common airway foreign bodies!
**Investigation methods in Late Presentation...**

### Table 3

<table>
<thead>
<tr>
<th>Advantages and disadvantages of CT and bronchoscopy for the positive diagnosis of bronchial foreign body in children.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multidetector CT</strong></td>
</tr>
<tr>
<td>Advantages</td>
</tr>
<tr>
<td>No anaesthesia</td>
</tr>
<tr>
<td>Rapid</td>
</tr>
<tr>
<td>Noninvasive</td>
</tr>
<tr>
<td>High sensitivity</td>
</tr>
<tr>
<td>Disadvantages</td>
</tr>
<tr>
<td>False-positive (mucus plug, artefacts)</td>
</tr>
<tr>
<td>Unrealiable for lesions &lt; 3 mm [21]</td>
</tr>
</tbody>
</table>

**REVIEW OF THE LITERATURE**

*Diagnostic value of various investigations in children with suspected foreign body aspiration*


A. Hitter\(^{a,*}\), E. Hullo\(^{b}\), C. Durand\(^{c}\), C.-A. Righini\(^{a,d,e}\)

---

In the Index Child....
We proceeded with Flexible Bronchoscopy
Diagnostic Algorithm for Tracheo-bronchial FB

Acute Presentation

1. Asphyxia?
   - Yes → Rigid bronchoscopy
   - No → 2. Radiopaque
     - Yes → Rigid bronchoscopy
     - No → 3. Unilateral reduction of VBS and unilateral emphesema?
       - Yes → Rigid bronchoscopy
       - No → Flexible bronchoscopy

Late Presentation

BFB +
Management of Index Child

Antibiotics

Meropenam + Vancomycin

Flexible Bronchoscopy done

Diagnosed to have central Foreign Body Just above the carina

Day of Hospital Stay D1

Mechanical ventilation

PRVC mode

✓ PEEP 6
✓ RR 20
✓ Target Tv 120 ml

Date

06.08

07.08

D2
Foreign Body Removal

RIGID BRONCHOSCOPY

Induced with Propofol

Paralyzed with Atracurium

Jet ventilation

4 pieces of Groundnut removed
1- just above the carina
2- Right main bronchus
1- left main bronchus

08.08
Date
Check X ray done after removal of foreign body
Showing resolving collapse consolidation left lung
In Ward

- BAL
  - E.Coli
  - Citrobacter
  - Pseudomonas
- Vanco + Mero
- Room air

CXR-left lower zone consolidation

- Developed distress
- Left lung air entry decreased
- Maintained Sao2 with face mask

Check Bronchoscopy done

- No residual Foreign body
- No mucous plugs

Discharged on 14th

10.8.  11.08(night)  12.8  13.8

Course and Management
CXR showing evidence of collapse consolidation of left lung (Readmitted to PICU)
Risk factors for Prolonged Pulmonary Recovery

<table>
<thead>
<tr>
<th>Total (N=77)</th>
<th>Hospitalization period</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;5 days (n=32)</td>
<td>≥5 days (n=45)</td>
</tr>
<tr>
<td>Median with range</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Hospitalization period (days) | 5 (2–32) | 3.5 (2–4) | 6.0 (5–32) | < 0.001 |
| Age (months after birth)      | 63.6     | 71.9      | 57.8       | 0.21    |
| Interval between inhalation and operation (days) | 19.7 (7.9–133.1) | 20.6 (7.9–133.1) | 18.5 (11.0–95.0) | 0.17    |
| Days from operation to extubation (days) | 1 (0–46) | 1 (0–46) | 2 (0–35) | 0.56    |
| Fever (≥37.5 °C) (%)           | 35.1     | 40.6      | 31.1       | 0.39    |
| Holzknecht's sign (yes) (%)    | 58.4     | 56.3      | 60.0       | 0.99    |
| Type of foreign body           |          |           |            | 0.02    |
| Inorganic material (%)         | 11.7     | 18.8      | 6.7        |         |
| Plant material other than peanut (%) | 20.8     | 31.3      | 13.3       |         |
| Peanuts or animal material (%) | 67.7     | 50.0      | 80.0       |         |

Holzknecht's sign represents a change in lung volumes related to inspiration and expiration with the midline shifts towards the affected side on inspiration.

Logistic regression analysis of risk factors for prolonged pulmonary recovery in children from aspired foreign body

Hiroshi Hidaka, Taku Obara, Shinichi Kuriyama, Shin Kurosawa, Yukio Katori, Toshimitsu Kobayashi
Final Diagnosis

Tracheo- Bronchial Foreign body Aspiration
Left Lung Collapse Consolidation
Hypoxic Seizures
Follow up..

Clinically - Symptom free
Radiological - Resolving left lung consolidation
What is uncommon in the index case?

- Age of Presentation
- Nature and Type of Presentation
- Bilateral Bronchial Foreign body
Approach to Suspected FBA

History of foreign body aspiration

Clinical symptoms non-specific

- Coughing
- Wheezing
- Stridor
- Shortness of breath
- Loss of voice
- Asphyxia

Critical patient

- Stable patient

Chest x-ray

Positive

Negative

Direct signs:
- Radio-opaque materials

Indirect signs:
- Shifting of the mediastinum
- Abnormal heart shadow size
- Emphysema
- Atelectasis

Chest CT

Positive

Negative

Direct signs:
- Demonstration of the foreign body

Indirect findings:
- Atelectasis
- Hyperinucency
- Bronchiectasis
- Lobar consolidation
- Tree-in-bud opacities
- Ipsilateral pleural effusion
- Ipsilateral lymphadenopathy
- Thickening of the bronchial wall

Bronchoscopy
Acknowledgements

- Dr. N.C. Gowrishankar MD., DNB.,
  Consultant Pediatric Pulmonologist
- Dr. K. Balakumar
  Consultant Pediatric ENT specialist
- Dr. Ramesh
  Consultant Pediatric Anaesthetist
- PICU Fellows at Mehta Children’s hospital
- PICU Nursing Staffs

Mehta Children’s Hospital
Thank You

Chevalier Jackson: pioneer and protector of children


C E B GIDDINGS¹, J RIMMER², N WEIR³