**ASPIRATED SHARPS IN THE PEDIATRIC AIRWAY – DEMOGRAPHICS AND COMPLICATIONS**

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**Introduction**

Foreign body aspiration (FBA) is a potentially life-threatening event which is preventable. FBA is defined as the passage of a foreign object beyond the vocal folds. Aspiration events can rapidly lead to obstruction of airflow causing stridor, respiratory distress, and ultimately asphyxiation. Other complications of FBA include laryngospasm, bronchospasm, atelectasis, respiratory distress, mucosal damage, and pneumonia. Signs and symptoms include dysphonia, cough, wheeze, stridor, and oxygen desaturation.

Diagnosis of FBA is made on a combination of history, physical exam, radiographs, and bronchoscopy.

Currently, the gold standard in therapy is rigid bronchoscopy and extraction using optical forces. Retrieval of sharp foreign bodies is complicated by additional risks to the respiratory mucosa. Sharp edges must be protected during extraction in order to minimize tissue damage.

Here we report on the demographics, signs, symptoms, and complications of sharp FBA in children over a 13.5yr period (Jan 2000 – July 2014) in multiple Canadian sites.

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**Methods and Materials**

Institutional codes were used to generate a list of all patients having undergone rigid bronchoscopy for suspected FBA. Only patients under the age of 18 were included. Supraglottic, glottic, and non-sharp objects were excluded. All fish bones and pieces of wood were excluded. For those with sharp FBA, chart review was performed for symptoms on history, signs on physical exam, history of peri-operative complications. Time from aspiration event to presentation at an emergency room was estimated based on available histories from the chart. The time from being seen by an ER physician to seeing an OTO-HNS specialist was taken from the recorded times of the respective consults in the chart. Time to OR and operative times were determined from the anesthetic and OR records. Chi squared and Student t-tests were performed using a statistical software package. Subgroup analysis was performed. Indigenous peoples were identified by the communities they resided in and/or citizenship status.

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**Results**

Sharp FBA tended to occur in children and adolescents. Males had a slightly older mean age than females (11.3 vs 9.1 yrs). The number of females and males with sharp FBA was similar (19 male, 14 female). Patients that resided in a native territory or were of native origin had a significantly greater rate of thumb tack aspiration (90.9%, 20 of 22 cases). All other populations combined showed a thumb tack aspiration rate of only 45.5% (5 of 11 cases). This difference was statistically significant (p = 0.005, chi-squared). No patient under the age of 5yrs aspirated a thumb tack.

The most important item on history was known inhalation of a foreign body (93.8% of cases). Pre-operative x-ray was efficacious in visualizing 93.8% of sharp foreign bodies. All thumb tacks aspirated were picked up on x-ray. The most common post-operative complication was atelectasis (6/30 cases) which trended towards a significant association with thumb tack aspiration (p = 0.13). One patient had fever. No other post-operative complications were reported and there were no fatalities.

Bronchoscopy findings during the SFB removal included 16 cases of mucosal injury, 3 cases of bleeding, and 3 cases of granulation tissue. Granulation tissue was found exclusively with >10 day delay in presentation to an Otolaryngologist. Thumb tacks showed a propensity to be found more distally than other objects with 20 found in a main stem bronchus (MSB) and 3 distal to the MSB compared to 5 in the MSB and 3 proximal to the MSB for other objects (p = 0.036).

The average time to presentation to an OTO-HNS to OR was 6.3hrs with a standard deviation of 9.2hrs. Patients with stridor were taken to OR with an average of 0.8hrs compared to 7.1hrs in the absence of stridor (p = 0.003, 2-tailed t-test).

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**Discussion**

Recent literature on sharp foreign body aspiration has centred on head dress pins in Middle Eastern women and blow darts in North American males. The incidence rate is believed to be behavioral in nature. In our study, Indigenous youths are at much higher risk of aspirating thumbs tacks. This is believed to be secondary to a game played in the communities whereby tacks are held in the mouth.

No serious complications were observed in our study despite delays to presentation and definitive treatment. Thumb tacks are associated with a trend towards more atelectasis. This may be due to their propensity to travel further down the bronchial tree.

The significant delay in presentation to a specialist in the male population raises questions of community and personal attitudes towards this population. This may put males at increased risk of sequela.

In our study, 2/3 of sharp FBA events occurred in Indigenous individuals.

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**Conclusions**

Sharp FBA aspiration is a serious condition with potentially fatal consequences.

Rigid bronchoscopy and retrieval with optical forces is a reliable method of treatment.

Sharp FBA events are likely related to behavioral factors that are modifiable.

In applicable populations, educational efforts should be made regarding the dangers of FBA.

As this is a retrospective study, it is subject to bias and incomplete follow up. Future studies should seek to standardize follow up to assess for long-term sequela.

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**Table 1. Physical exam and x-ray findings at presentation.**

<table>
<thead>
<tr>
<th>Object aspirated</th>
<th>Number of cases</th>
<th>Sign/Symptom</th>
<th>Cases by percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thumb Tack</td>
<td>25</td>
<td>Cough</td>
<td>78%</td>
</tr>
<tr>
<td>Brick</td>
<td>1</td>
<td>Choking</td>
<td>48.5%</td>
</tr>
<tr>
<td>Pencil tip</td>
<td>1</td>
<td>Dyspnea</td>
<td>24%</td>
</tr>
<tr>
<td>Hair Clip</td>
<td>1</td>
<td>Chest Pain</td>
<td>18%</td>
</tr>
<tr>
<td>Magnet</td>
<td>1</td>
<td>Hemoptysis</td>
<td>18%</td>
</tr>
<tr>
<td>Star – metal</td>
<td>1</td>
<td>FB sensation</td>
<td>12%</td>
</tr>
<tr>
<td>Star – plastic</td>
<td>1</td>
<td>Irritability</td>
<td>9%</td>
</tr>
<tr>
<td>Straight Needle</td>
<td>1</td>
<td>Hoarseness</td>
<td>9%</td>
</tr>
<tr>
<td>Cogwheel</td>
<td>1</td>
<td>Vomiting/Fever/Drooling</td>
<td>4% (each)</td>
</tr>
</tbody>
</table>

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**Table 2. A. Objects aspirated by patients. B. Rates of signs and symptoms recorded at presentation.**