TIPS AND TRICKS FOR MANAGEMENT OF FOREIGN BODIES IN YOUR OFFICE
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Declaration of Disclosure
We have no actual or potential conflict of interest in relation to this program.

We also assume responsibility for ensuring the scientific validity, objectivity, and completeness of the content of my presentation.

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Savithiri Ratnapalan

Learning Objectives
At the end of this session, you will be able to:
• Discuss challenges and solutions to management of foreign bodies in children in an office-based setting
• Identify foreign bodies affecting eyes, nose, ears and gastrointestinal tract that require prompt referral
• Practice effective techniques for removing foreign bodies from eyes, nose and ears in children

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Outline
Part 1 – Foreign bodies Ears, Nose, Eyes, Skin
Practice application
Break
Part 2 – Aerodigestive foreign bodies

Foreign Bodies
Ears and nose most common sites
Ear
◦ Insects, paper, food, earring parts, toy parts and hair beads
Nose
◦ Beads, food, paper, toy parts
Foreign Body - Ear

Epidemiology
- Foreign body in the external ear canal (EAC)
- Children ≤ 6 yo
- Can occur after 9 mos when pincer grasp is obtained
- Predisposition in children with ear conditions (OM, OE, cerumen impaction)
- Typically on side with dominant hand
- Common items: beads, paper, bean, insect, toys, crayon tips

Presentation:
- Often asymptomatic
- Witnessed by caregiver
- Pain, discharge, hearing loss (if canal is occluded)
- Important questions: Tympanostomy tubes? Drainage?

Physical exam:
- Otoscopic exam (bilateral ears)

Considerations for urgent removal:
- Button batteries
- Potentially penetrating FBs
- Insects
- Symptomatic (pain, nausea, vomiting, vertigo, nystagmus)

Foreign body removal EAC in the ED

254 Cases FB ears - retrospective review
- 63 % boys; mean age 6 years (2.5 – 20 yrs)
- 80 % success rate in the ED

Unsuccessful – 20 % (50 Cases)
- 10 patients direct referral to ENT
- 35 FB removed in clinic
- 15 FB operative removal

Complications 12 %
- 29 minor – bleeding and/or laceration
- 1 Perforation TM

Marin J and Trainor J, Peds Emerg Care, 2006

ED vs ENT

82 Nose Foreign Bodies
- 75 (90%) attempted by ED
- 53 (65 %) successfully managed by ED
- ENT clinic 21 were removed
- GA 8

58 Ear Foreign Bodies
- 33 (57%) attempted by ED
- 4 (7 %) successfully managed by ED
- ENT Clinic 23 were removed
- GA 31

When to Refer to ENT

• Failed attempt at removal
  o Inadequate immobilization
  o FB touching TM
  o Spherical objects
  o Improper equipment
  o Inexperienced MD
• Battery not easily removed by forceps
• If sedation is deemed necessary
• Perforated TM

Visualization is key

Headlamps – cheap
Free physician’s hands
Provide binocular vision and better lighting

Removal Techniques

Curette: edge of canal

Alligator Forceps: soft objects, graspable (e.g. paper, cotton or foam)

Irrigation: not wedged, non-graspable, round, smooth or friable

Suction: light, moves easily or free floating, non-graspable, round, smooth or free-floating (e.g. bead, bean)

Right angle hook, wire loop: Non-graspable, round, smooth or free floating (e.g. bead, bean)

Curette, Forceps & Suction

Often difficult to directly visualize FB at same time
Ear canal is sensitive and child may quickly become uncooperative
Potential for trauma to canal or TM

Glue to Remove Foreign Bodies

Apply thin coat of tissue glue to end of swab stick
Insert into ear canal and allow glue to bond with FB for about 1 minute
* Needs to be clearly accessible and suitable

Removal Technique

Irrigation
  • 16-18 G angiocath
  • 20 cc syringe
  • Warm water

Irrigation – Contraindications
  • TM perforation
  • Vegetative matter
  • Batteries
  • Tympanostomy tubes
Foreign Body - Nose

Presentation:
• Most present within first 24 hours (13-27% > 24 hours)
• Unilateral discharge +/- foul smell (14-35%)
• Epistaxis
• Occluded nare, mouth breathing

Physical exam:
• Examine bilateral nostrils

Nasal Foreign Body Removal

Success rate in ED 92 – 98 %

Techniques:
• Mechanical extraction
• Suction
• Positive Pressure
• Balloon catheter

Just Blow

Positive Pressure Techniques
Older children: occlude opposite nostril and have them blow
Younger children: “Parent’s Kiss”
• Have parents blow into mouth of child while occluding contralateral nostril
• Modified version with straw between child’s mouth and parent’s mouth
Ambu-bag over mouth
40 % failure rate

Balloon Catheter

Test balloon catheter
Lubricate with jelly
Insert catheter beside foreign body until balloon is posterior to foreign body
Inflate balloon
• 2 mL small children
• 3 mL larger children

Complications

Nasal mucosal ulcerations, nasal septal perforation, nasal or choanal stenosis
• Button batteries or mini-magnets
• Leakage of alkaline solution or thermal burns from a generated current

Aspiration
• No published reports
• Higher risk at time of removal for posterior objects

PEARLS

• Do not push FB in the nose as may be aspirated
• Never use irrigation to remove disc batteries, vegetable matter, or expansible objects (e.g. sponge) in the ear
• If suspect battery or any difficulties contact ENT
• Decongestant nasal spray to facilitate visualization and removal
• Use appropriate equipment with excellent illumination
• If at first you don’t succeed, DON’T try, try again
Child in your office saying ‘something went in to my eye’

**History:**
- When did it occur?
- What substance was involved?
- Was there prior treatment?
- Any other injuries?
- Wearing safety glasses when injury occurred

**Exam**
- Check eyes: pupil if round and reacting
- Check vision
- Flip the eye lids and look
- Fluorescein / + Tetracaine

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Pupil not round!!

- Do not make the child cry
- NPO
- Call ED (Hospital with a Paediatric eye surgeon / eye surgeon)
- Send the child ASAP

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**Eyelid Eversion**

- Ask child to look down
- Ask the person to gently close the eye
- Grasp the eyelashes of the upper eyelid with thumb and forefinger
- Hold Q-tip applicator horizontally against outer eyelid and push down and fold eyelid on itself
- As soon as the lid is everted appose the fingers and hold lashes up against the eyebrow

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**Causes of Eye Burns in Children**

- Cleaning Products: drain, oven, bathroom, tile etc.
- Dishwasher, laundry detergent packets
- Nail primers

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**Home Management**

- Irrigation with room temperature running water with eyelids held open for 10 – 15 minutes
- Use of tap water is safe!

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**Eye Irrigation**

- Purpose – removal foreign body, normalization of pH for caustic injuries
- **Requires copious fluid** – Normal saline or ringers lactate
- Delay can result in significant effect in outcome and prognosis
- Warmed solution may be more comfortable
- Topical anesthetic may be helpful
- Use of Morgan Therapeutic Lens

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**Irrigation Times**

For Irritants
- 20 – 30 minutes minimum

For acids and alkalis
Irrigate with 2 L fluid per eye
Wait 5 – 10 minutes
Measure pH of cul-de-sac
Repeat until pH is between 7.5 - 8

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**Contraindications**

- Protruding foreign body
- Penetrating eye injury
- Suspected or actual rupture of the globe
- Instilling anesthetic agents with known allergies

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**Ingested Foreign Bodies**

Most commonly in paediatric population
- Most asymptomatic
- May get lodged in esophagus
75 % in < 5 years, peak incident 6 mo – 3 yrs

Commonly ingested items
- Coins, small toys, buttons, bones, jewelry, retained pieces of food
10 – 20 % require endoscopic removal; <1 % require surgical removal

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**Radiographs**

Only radio-opaque objects detected
Foreign body survey – includes neck, chest, abdomen

**Positive predictive value**

- Metallic objects 100 %
- Glass 43 %
- Fish bones 26 %
- Wood radiolucent

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**Ingestions - Coins**

Most common ingestion in children

Presentation:
- Often asymptomatic but witnessed by caregiver or reported by child
- Esophagus: refusal to eat, dysphagia, drooling, wheezing, stridor, choking
- Stomach/intestines: typically asymptomatic, vomiting/anorexia if obstructed
- Systematic review of coin ingestions – vomiting & drooling most common symptoms

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**Ingestions: 3 common sites for FBs to lodge**

1. Upper esophageal sphincter(most common site)
2. Level of the aortic arch
3. Lower esophageal sphincter
Ingestions - Coins

- Often normal exam
- HENT: impacted FB, note drooling, signs of esophageal perforation (crepitus, swelling)
- CHEST: WOB, breath sounds
- ABD: Peritoneal irritation
- Imaging: AP/Lateral x-rays of neck, chest, abdomen
- Red Flags: signs of airway compromise, esophageal obstruction (cannot swallow secretions), abdominal pain/vomiting

Button Batteries

- Common in many items – watches, hearing aids, key fobs, toys, remote controls
- Made of lithium – possess electrical charge
- Esophageal
  - Rapid mucosal damage, necrosis and perforation
  - Immediate endoscopic removal
  - "Halo" sign or double density at the periphery
- Other locations:
  - Gastric/SB
  - Small bowel

Clinical Presentation

- Highly variable
- 50% asymptomatic
- Esophageal
  - Drooling, blood in saliva, gagging or dysphagia
  - Pressure sensation or pain in neck, throat, chest or abdomen
  - Vomiting, refusal to eat
  - Irritability
- Uncommon - signs and symptoms of bowel obstruction
  - Vomiting, abdominal pain, rigidity, rebound tenderness

Evaluation

- Assessment of airway and breathing efforts
  - Stridor or wheeze – suggestive of aspiration
  - Crepitus neck – suggestive of esophageal perforation
- Abdomen
  - Pain, rigidity, rebound tenderness suggest intestinal or colonic perforation

Timing of endoscopic intervention in pediatric foreign body ingestions

<table>
<thead>
<tr>
<th>Type</th>
<th>Location</th>
<th>Symptoms</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Button battery</td>
<td>Esophagus</td>
<td>Yes or No</td>
<td>Emergent Emergent Urgent (if age &lt; 5 and BB 2:20 mm) Elective if not moving on serial x-rays</td>
</tr>
<tr>
<td>BB market</td>
<td>increased diameter and a change to lithium cells.</td>
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BBs >20 mm in diameter increased from 1% to 18% in a BB ingestions by 2008.
94% of known fatalities.
Lithium Batteries

- Longer shelf life
- Lighter weight
- Ability to carry 2X voltage of previously used mercuric oxide, manganese dioxide and zinc cells
- Mechanism of injury
  - Generation of hydroxide radicals in the mucosa resulting in caustic injury from high pH instead of electrothermal injury
- Accounts for 25% of BB ingestions and 94% of known fatalities

Complications of Button Battery Ingestion

- Tracheoesophageal fistula (47.9%)
- Esophageal perforation (23.3%)
- Esophageal strictures (38.4%)
- Vocal cord paralysis from recurrent laryngeal nerve injury (9.6%)
- Mediastinitis
- Cardiac arrest
- Pneumothorax
- Aortoenteric fistula

Ingestions - Magnet

Presentation:
- Asymptomatic
- Vomiting, abdominal pain
- Peritonitis

Investigations:
- Foreign body xray scan

Kramer et al., JPNG, 2015
Pointed Objects

Nails, pins, tacks, toothpicks, hairbrush bristles, pine needles
10% of ingested foreign bodies described as sharps

Early 20th century safety pins and nails most common (cloth diapers)

Cultural factors
• Asian and Mediterranean descent – fish bones
• Ethnic groups that use pins to fasten clothing or for religious or cultural beliefs

Upper Airway Obstruction

• Prevention is key!
• 492 parents surveyed regarding knowledge of choking hazards
• Parental reports on being instructed on risk of:
  • Fruit chunks, raw vegetables, chunks of peanut butter (>50%)
  • Hot dogs, popcorn, whole grapes, seeds (~70%)
  • Nuts, sticky candy, gum (~80%)
• Parents who received instruction on particular choking hazard also reported avoiding it (vs. parents who did not receive instruction)

Nichols et al., Int J of Pediatric Otorhinolaryngology, 2012.

Foreign Body Aspiration

33% choking episodes occur in infants
75% in children < 3 yrs.

Dangerous food and toys – small enough to fit in the airway, cylindrical shape, compressible

Clinical presentation—
• 80-90% have history of choking
• Range from severe respiratory distress to asymptomatic
• Location, size and quality contribute to presenting symptoms

Factors Associated with Delayed Presentation

< 3 yrs
Negative CXR
• 50% of known cases of aspiration will have normal CXR
• Special projections may help but should NOT be used to rule out condition

No history of witnessed aspiration episode
Lack of typical symptoms

Clinical Presentation

<table>
<thead>
<tr>
<th>Larynx</th>
<th>Trachea</th>
<th>Bronchus</th>
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<tbody>
<tr>
<td>Dyshonia</td>
<td>Symptoms of complete obstruction</td>
<td>Triad – 65%</td>
</tr>
<tr>
<td>Hoarseness</td>
<td>Biphasic stridor</td>
<td>Cough, wheeze, decreased breath sounds</td>
</tr>
<tr>
<td>Complete obstruction</td>
<td>Dry cough</td>
<td>Asymptomatic</td>
</tr>
<tr>
<td>Severe respiratory distress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyanosis</td>
<td></td>
<td></td>
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<tr>
<td>Cardiac arrest</td>
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### General principles of ingested FB

1. Emergent if symptomatic
2. Button batteries are bad
3. Magnets are asymptomatic until bowel necrosis/ perforation

### Take home points

- Most foreign bodies past without incident
- Need to be aware of dangers of battery and magnet ingestion
- Medical history is the most predictive part of the evaluation – believe the parents!!
- Consider referral if history suggestive of foreign body aspiration even if physical exam normal
- Prevention is key! Opportunity to educate families.

### Selected References