The Physical Hazards of Foreign Materials

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Objectives

• Describe generally the physical hazards of ingested foreign bodies
• Review epidemiologic and clinical data on foreign body ingestion
• Describe Federal efforts, based on the characteristics of the foreign material, to minimize risks to human health
What Parts of the Human Anatomy are at Risk?

- Digestive Tract
- Respiratory Tract
- Mouth and Teeth
- Extremities (Hands)
Hazards to the Digestive Tract

- Esophageal laceration
- Esophageal perforation
- Fistula formation
- Laceration or perforation of other portions of the digestive tract
  - Pharynx
  - Stomach
  - Intestine
Hazards to the Respiratory Tract

- Choking—occlusion of the airway
  - Children under age 3 at greatest risk
  - Common hazards are foreign objects (coins or toys) or food, though not foreign objects in food
  - Objects may become lodged in the upper esophagus and cause choking/asphyxiation by compression of the trachea
Hazards to the Respiratory Tract

• Aspiration--inhalation of foreign matter into the bronchial tree--may result in:
  – partial lung collapse
  – secondary infection
  – destruction of lung tissue from retained material
Bronchi, Bronchial Tree, and Lungs

- Larynx
- Pulmonary vein
- Pulmonary artery
- Trachea
- Primary bronchi
- Secondary bronchi
- Tertiary bronchi
- Bronchioles
- Cardiac notch
- Alveolar duct
- Alveoli
Hazards to the Mouth and Teeth

- Lacerations of the mouth
- Lacerations of the tongue
- Chipped teeth
- Broken fillings
- Damage to prosthetics
Other Hazards

• Lacerations on the hands occurring during food preparation
• Illness complaints
  – Nausea and vomiting
  – Diarrhea
  – Headache, fever and dizziness
  – Chest pain
Clinical Observations about Foreign Body Ingestion

- About 80% of foreign body (FB) ingestions occur in the pediatric age group
- 80-90% of FBs ingested will pass spontaneously over 4-7 days
- Estimated that 1-5% of FBs ingested will result in injury
Clinical Observations about Foreign Body Ingestion

• Sharp objects account for about 10% of FB ingestions, but a disproportionate number of injuries

• In a case series of foreign bodies removed surgically, 37% were in the airway and 63% were in the upper digestive tract
Clinical Observations about Foreign Body Ingestion

- In a review of FDA consumer complaints of foreign materials in food, the most frequently reported injury was mouth or throat laceration.
- In the FDA review, glass was the foreign material most frequently reported as causing illness or injury.
Characteristics of Foreign Materials that May be Hazardous

Size of the Object

- FSIS in its 1995 Public Health Hazard Analysis Board on bone particles concluded:
  - bone particles < 1 cm not a safety hazard;
  - particles 1-2 cm are a low risk;
  - particles > 2 cm have the potential to be a safety hazard and may cause injury
Characteristics of Foreign Materials that May be Hazardous

Size of the Object

• FSIS (1995): The presence of foreign material other than bone may pose a potential hazard, and each instance should be considered on a case-by-case basis, irrespective of size.
Characteristics of Foreign Materials that May be Hazardous

Size of the Object

- Consumer Product Safety Commission (1995): spherical objects < 1.75 inches in diameter are dangerous to children under 3 years (choking, ingestion or aspiration)
- CPSC uses a Small Parts Test Fixture (a cylinder) to judge other non-spherical objects for choking hazard
Characteristics of Foreign Materials that May be Hazardous

Size of the Object

- FDA Health Hazard Evaluation Board conclusions in cases of foreign materials (1972-1997) found that 56% of objects 1-6 mm might pose a limited acute hazard
- For objects > 6 mm, only 2.9% were judged to present no hazard
Characteristics of Foreign Materials that May be Hazardous

Size of the Object

• FDA/ORA Compliance Policy Guide
  – Criteria for direct reference seizure: Hard or sharp objects 7-25 mm and RTE
  – Criteria for recommending legal action:
    • 7-25 mm and requires additional preparation
    • < 7 mm and intended for special-risk group
    • > 25 mm in length
Characteristics of Foreign Materials that May be Hazardous

Shape of the Object

- Spherical or cylindrical shaped objects present a greater risk for choking
- Slender and sharp or pointed objects present a greater risk for laceration or perforation
Characteristics of Foreign Materials that May be Hazardous

Consistency of the Object

• rigid objects (e.g., coins) caused most choking deaths in children 3 years and older

• conforming objects (e.g., balloons) caused more choking deaths in children under age 3 years
Conclusions

- Foreign material contamination does occur in food items
- Injuries have resulted from foreign materials in foods
- Size matters: particles in food that are small are more likely to escape detection, but less likely to cause injury
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