Ingestion of Coins and Batteries
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Witnessing the ingestion of a foreign body by a toddler is alarming and immediately raises several questions. What are the risks of aspiration and airway obstruction? Where do foreign bodies get stuck? Are investigations necessary in the absence of symptoms? How long can objects be watched at different locations? What complications can result? When should objects be removed and which procedure should be used? When can cathartics or enemas be given safely?

Predisposing Factors
The peak age range for foreign body ingestion is 6 months to 3 years. There are underlying social, developmental, or psychiatric risk factors in up to 30% of cases. Ingestions in older children usually are accidental. Symptoms occasionally can suggest an underlying abnormality such as an esophageal stricture or might be related to a previous surgical procedure such as the repair of an esophageal atresia or a pyloromyotomy for pyloric stenosis. Children who have had esophageal atresia repaired also have associated dysmotility of the distal segment.

The Need For Radiologic Investigations
The nature of the ingested foreign body obviously influences management. Directed questions or a search of the home for missing objects often will reveal the nature of the ingested object. The presence of symptoms such as choking, dysphagia, substernal discomfort, persistent cough, or of physical findings such as drooling mandates a radiologic search for foreign bodies from oropharynx to anus. Even in the absence of symptoms, a radiologic investigation should be performed to determine the nature, number, and location of ingested objects. However, it should be noted that some foreign bodies, such as aluminum “pop-tops,” are radiolucent. North American coins, including the post-1982 penny (97.6% zinc), have been minted with radiopaque metals at the insistence of pediatricians and radiologists.

Foreign Bodies in the Esophagus
Most foreign bodies that cause problems do so in the esophagus. Not only is this the narrowest portion of the gastrointestinal (GI) tract, but it also is related closely to the airway. There are three typical areas of narrowing where foreign bodies tend to get stuck. The most proximal and narrowest region is at the cricopharyngeus; next is in the mid-esophagus, where the left main stem bronchus or aorta indents the esophagus; and the most distal is at the gastro-esophageal junction. The risk of complications is related to the shape, location, and especially the duration an object remains impacted. Round objects such as coins and batteries rarely perforate by direct penetration, but rather by ischemic necrosis from long-standing contact.

Objects in the esophagus always should be removed regardless of whether there are any symptoms. Several means are accepted for retrieving foreign bodies from the esophagus. If the ingestion occurred less than 24 hours before presentation, a Foley catheter can be employed under fluoroscopic visualization without general anesthesia. In the past, use of a Foley catheter for foreign body extraction in children was considered controversial because of the risk of aspiration. However, recent series have shown this to be effective and safe when the duration of impaction has been less than 24 hours. It should be stressed that all fluoroscopic procedures should be performed when the patient is supine and only by experienced radiologists to prevent inadvertent airway aspiration when withdrawing the object. The disadvantage of this technique is that radiolucent objects, as well as intrinsic and iatrogenic lesions, cannot be seen.

Objects present in the esophagus for more than 24 hours should be visualized directly and removed by rigid or flexible endoscopy under general anesthesia. Tracheobronchoscopy should be available if there is any question of airway aspiration. Objects that have pointed ends deserve special consideration. For instance, a straight pin can be withdrawn with a magnet tube if the sharp end faces distally. An opened safety pin with the sharp end facing proximally can be advanced with an endoscope to the stomach, where it can be turned around and withdrawn or brought into a protective sleeve.

Foreign Bodies in the Stomach
Once in the stomach, 95% of round objects will continue through the GI
tract and pass spontaneously. Button (wafer or disk) batteries pose a special risk. Batteries should be removed if stationary for 24 hours because gastric acid can erode or dissolve the plastic seal, allowing release of toxic metals such as mercury, manganese, zinc, silver, nickel, cadmium, or lithium. All button batteries contain strong alkaline electrolyte solutions of either potassium or sodium hydroxide at concentrations that can approximate an 8N solution. Alkaline manganese and mercury batteries pose the greatest risk of toxicity.

Radiographs are essential to establish the presence of an alkaline disk battery and to determine whether the casing is open. Button batteries can adhere to and penetrate the GI wall by two additional mechanisms: low voltage burns, if active and intact, or through corrosion by leaking contents, even if uncharged and hence discarded.

If the battery remains proximal to the pylorus, it might be removed under fluoroscopy via an orogastric magnet tube or under general anesthesia via endoscopy. Therefore, after ingestion, the child should be kept NPO and in a left decubitus position until a radiograph is taken. Failure of these methods necessitates operative removal of any battery that is stationary for 24 to 48 hours. The passage of coins through the GI tract usually can be followed with a weekly radiograph for up to 4 weeks, provided the child is asymptomatic.

**Foreign Bodies in the Intestine**

Less common sites of impaction have been encountered beyond the pylorus. Elongated objects can get caught in the C-loop of the duodenum or at the ligament of Trietz. Occasionally, small objects can become trapped in either a Meckel diverticulum or the appendix. In the absence of symptoms, all other objects can be followed for up to 4 weeks. Again, button batteries require special monitoring via a daily radiograph. In the absence of symptoms, cathartics or enemas can help once the object has reached the colon. Parents can be reassured that straining of stools is unnecessary, although most will observe the diaper contents casually in hopes of finding the foreign body. Any object that is stationary for 7 days, or in the presence of GI symptoms, obstruction, or peritonitis, must be removed surgically.

**SUGGESTED READING**


Consultation with the Specialist: Ingestion of Coins and Batteries
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