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CLINICAL VIGNETTE

Penny Ingestion: A Common Problem in the Pediatric Population

By Brian S. Morris, MD

Case Report

The patient is a 5 year-old boy with a history of allergic rhinitis and GERD who was playing in his bedroom when his parents found him crying. The child refused to tell his parents why he was crying but eventually he told them that he had found a penny in his bed, put it in his mouth to see what it taste like, and accidentally swallowed the penny. He had no throat symptoms and his breathing was normal. He also had no nausea or abdominal pain. He was, however, very scared. His parents took him to see his pediatrician for evaluation.

His physical examination revealed a blood pressure of 98/60 mm hg, pulse of 70 beats/minute (at rest), temperature of 36.8 C, respiratory rate of 16/minute. He appeared well hydrated and without stridor or wheeze. His voice sounded normal but he did appear frightened. His physical examination was unremarkable. His pharynx was moist and within signs of trauma or foreign body. His neck exam was without masses or tenderness. Trachea was midline without adenopathy. His lungs were clear in all zones. His abdominal exam was nontender, nondistended, without masses, and with normal bowel sounds.

General Discussion and Epidemiology

The ingestion of coins such as a penny is a very common occurrence in the pediatric population with approximately 100,000 foreign body ingestion cases being reported annually¹. There are approximately 1500 childhood deaths per year related to foreign body ingestion². The highest risks period is when children become interested in objects and the sensation of taste. In The United States, coins are by far the most commonly ingested foreign body in children with batteries, screws, buttons, crayons, marbles, and toy parts also being common³. Approximately 4% of patients swallow a coin during the childhood years, typically during the first five years of life⁴. Ingested foreign bodies pass through the GI tract without causing harm in approximately 80-90% of cases. Only 10-20% of patients require endoscopic or surgical removal of the foreign body⁵. The upper esophagus (at the cricopharyngeus

muscle), the mid-esophagus at the aortic arch, the lower esophageal sphincter, pylorus, and ileo-cecal valve are the most common areas where coins become obstructed⁶. The general rule of thumb is that coins that measure less than 2 cm. in diameter are more likely to safely pass through the GI tract while larger coins are more likely to become obstructed and cause problems⁴.

Clinical Features and Outcomes

Children who ingest a coin are often asymptomatic with only about 50% displaying any symptoms⁷. Such symptoms are most commonly chest pain, dysphasia, cough, throat pain, weight loss, drooling, wheezing, unwillingness to eat, and nausea⁸. These symptoms are usually related to the location of the foreign body either in the throat, esophagus, or elsewhere in the GI tract⁹. The most common locations where foreign bodies such as coins lodge are the upper esophageal sphincter (at the cricopharyngeus muscle) and the lower esophageal sphincter. Coins and other foreign bodies that lodge in the mid-esophagus are often related to strictures or fistulas¹⁰. Delayed presentations of up to 6 months have been reported and such patients can present with atypical signs and symptoms¹¹. Rarely, complications such as esophageal perforation with pneumomediastinum, hepatic abscesses with perforation, an appendicitis-like presentation, and ileitis that mimics inflammatory bowel disease have been reported¹². Less commonly, coins become lodged in more distal location such as the appendix, ileo-cecal valve, or the sigmoid colon¹³. Prior surgery in the upper GI tract is a predisposing condition for obstruction.¹⁴ Congenital abnormalities in the GI tract are another predisposing factor in some children¹⁵.

Diagnosis and Pathogenesis

A careful, detailed history and physical examination are most important when assessing a patient after ingesting a foreign body such as a coin. This is particularly important, as children do not always

present the most accurate historical account. First, patency of the airway and adequacy of breathing should be assessed and addressed. Next, efforts should be made to assess for the likely location of the coin or other foreign body. The shape and composition of the foreign body can affect this investigation especially if the object is sharp or a magnet¹². Batteries are also a special situation in such patients.¹⁶ On neck examination, signs such as crepitus, tenderness, or swelling can be found. On pulmonary exam, the clinician should look for stridor on inspiration or wheezing on expiration. On abdominal exam, tenderness or signs of bowel obstruction can occasionally be found.

Most of these children, however, have normal physical examinations. Thus, plain x-rays of the neck, chest, and abdomen are the cornerstone of diagnosis and are usually obtained. It is very important that aspiration be ruled out as coin can lodge in the upper airway and be acutely life threatening. Aspiration of foreign bodies is responsible for a significant number of deaths per year with deflated balloons and hotdogs accounting for the majority of such cases. Most of these cases occur in children under the age of 2 years⁴. Coins are radioopaque and can appear circular or linear depending on how the coin is oriented in the body¹⁷. Coins in the esophagus are typically seen face forward on frontal plane and on edge on lateral view¹⁸. The opposite is typically true for coins lodged in the trachea. Occasionally, multiple foreign bodies can be seen on x-ray even when the history would suggest that only one object was swallowed¹⁹. Some recommend that x-rays should be taken in two planes to get an optimal view of the coin(s)²⁰. Gastrointestinal contrast studies of the upper or lower tract are avoided as contrast can be aspirated if there's an upper GI obstruction and contrast can obstruct the lower tract if colonoscopy is necessary²¹. Handheld metal detectors have gained a limited diagnostic role in such cases²².

Treatment

Once the location, composition, and number of foreign bodies have been assessed, procedures (such as endoscopy, bougienage, and foley catheterization of the esophagus) may be necessary to remove the object(s). Such procedures are typically performed if the object is large (over 5 cm in diameter) or sharp, if the object is stuck in the esophagus or stomach, if the airway is compromised, if the object is a magnet, or if there are significant clinical signs such as fever, vomiting, or abdominal pain.⁹ If none of these criteria are met, observation is the usual standard of care

especially if the patient is asymptomatic and swallowed the coin within the last 24 hours²³. Up to 35% of children who have a coins lodged in the esophagus are asymptomatic at presentation²⁴. If the coin is present in the esophagus or stomach for longer than 24 hours, a procedure should be considered to remove the object⁴. Ulcers, perforations, bleeding, strictures, and fistulas can occur if the object remains in the upper GI tract for an extended period of time²⁵. Sharpness and length of the object, the presence of a battery, and location of the object in the mid-distal esophagus also increase the risk of complications and suggest the need for earlier intervention²⁰.

There are multiple procedures that are used, if necessary, to remove foreign objects such as pennies. Flexible and rigid endoscopy is commonly used procedures with the flexible scopes being safest and most frequently used especially if the coin and surrounding tissue can be visualized²⁶. Under some circumstances (especially for impacted sharp objects in the proximal esophagus or at the level of the hypopharynx), the rigid endoscopy can be used although this procedure presents some added risks²⁷. Forceps are also sometimes used to remove coins from the throat or upper GI tract often using the "penny pincher" technique where grasping forceps are played through a nasogastric tube under fluoroscopic guidance to gently grasp and remove the coin²⁸. These are typically used after endotracheal intubation through the use of a laryngoscope²⁹. In rare circumstances, a dilator (bougienage) is passed down the esophagus to free up a coin and allow it to pass further downstream. This type of procedure is limited in that it does not allow for direct visualization of the GI tract and does not retrieve the foreign body so most specialists prefer an endoscopy whenever possible. A bougienage does have a role though in select cases where the coin is likely to pass through the remainder of the GI track (if the coin is less than 2 cm. in diameter) and damage to the GI tract is felt to be unlikely³⁰. Under rare circumstances, a foley catheter is placed down the esophagus past the coin, inflated with contrast material, and the coin is gently dragged up to the mouth. This procedure carries significant risks so endoscopy is generally preferred whenever possible⁴.

Although the specifics of each clinical scenario should be carefully considered, there are some general rules that can be applied to ingested coins. It is recommended that these children have x-rays on presentation to check to see where the coin is situated³¹. If the coin was swallowed less than 24 hours prior, is located in the esophagus, and the child is asymptomatic, most clinicians choose to observe

the patient for a short period of time³². If the coin will pass into the stomach, it will typically do so within the first 12-24 hours³³. If the coin doesn't pass into the stomach promptly (within 12-24 hours) or if the child develops symptoms or if the object has high risk features (such as being long or sharp), a procedure such as laryngoscopy and/or endoscopy should be considered to remove the object³⁴. Oftentimes, the coin is noted to be in the stomach at initial presentation and these coins will typically pass out of the GI tract within 1-2 weeks if the coin is less than 2 cm. in diameter⁴. Coins with a diameter of more than 2 cm. or length of more than 5 cm. are less likely to pass through the stomach so a procedure is more likely to be necessary to remove the object⁴. Objects cannot be allowed to remain in the esophagus or stomach for too long due to the risk of ulcer, obstruction, and aspiration. In addition, coins can become more difficult to remove the longer they remain in the GI tract due to surrounding tissue damage. Once the penny (or other small object) has made it to the stomach, there is an 80-90% chance that it will pass through the GI tract without event³⁵. Most clinicians check serial x-rays to follow the path of the coin to ensure that it is passing through the GI tract without difficulty³⁶. Most specialists do not allow coins to remain in the esophagus for more than 24 hours or to remain in the stomach for more than 3-4 weeks⁴. High risk objects such as large or sharp objects or batteries often necessitate a more urgent procedure due to their higher risk of complications⁴. An urgent procedure may become necessary at any time should the coin cause acute problems such as obstruction or perforation although such issues are less likely once the coin has passed the proximal duodenum³⁰.

There has been some recent debate over the recent compositional changes in pennies and the possibility of zinc toxicity, which can cause problems such as hemolytic anemia⁴. Pennies minted after 1982 are composed mostly of zinc while those minted before 1982 were mostly copper³¹. Thus, post-1982 pennies must exit the GI tract within a short period of time to avoid the risk of zinc toxicity³⁷. This is particularly a concern in children who have swallowed multiple pennies²⁶.

Although coins are the most commonly swallowed foreign bodies in the pediatric populations, there are other objects that are commonly swallowed that can require urgent evaluation. Such foreign bodies include long or sharp objects, magnets, and batteries.

Prognosis

The prognosis for children who swallow a penny is generally very good. Most pennies pass through the GI track within 1-2 weeks and cause no problems⁴. Despite this, potentially very serious complications can occur in 10-20% of cases so evaluation and appropriate testing is very important. Even in asymptomatic children, X-rays are usually performed to check for the location of the penny. Pennies that remain lodged in the esophagus and stomach can usually be removed with procedures such as endoscopy. Pennies that exit the stomach will usually pass through the remainder of the GI tract although such patients should be observed carefully to ensure that complications do not occur and that the penny has definitely exited the body. Procedures or surgery can be considered if objects remain in the body beyond 1-2 weeks. It is important to ensure that the penny doesn't remain in the body due to the possibility of zinc toxicity in post-1982 pennies.

Clinical Course and Follow-Up

The five year-old boy was taken to see his pediatrician who ordered a plain x-ray that showed a radiolucent line that appeared to be past the stomach. The patient remained asymptomatic and observation was recommended. After 22 hours, the child's stool was noted to contain a 2012 U.S. penny.

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