

Management of gastric metallic foreign bodies in children

Andrew Au Ran D. Goldman MD FRCPC

Abstract

Question A 2-year-old boy presented to my clinic after a caregiver witnessed him swallow a foreign body. The caregiver recalls seeing a small metallic object but is unsure exactly what was ingested. The child was asymptomatic upon examination. How should I identify and localize the foreign body? Do metal foreign bodies need to be removed endoscopically?

Answer Foreign body ingestion is very common in children. Considerations must be made for the type of foreign body and site of impaction. A clear patient history and radiographs should be used to localize and identify the object. Handheld metal detectors can also be used to localize known metallic foreign bodies. Most metallic objects that pass the esophagus and reach the stomach will continue to pass without complication. Bowel perforation, sepsis, and even death have been documented in extremely rare cases of multiple magnets, button batteries, and long, angular, or 2-pointed sharp objects. These objects must be removed. Other metallic foreign bodies including coins and single magnets can be managed conservatively with stool monitoring.

Prise en charge de cas de corps étrangers métalliques dans l'estomac d'enfants

Résumé

Question Un garçon de 2 ans s'est présenté à ma clinique après que sa gardienne l'eut vu avaler un corps étranger. La gardienne se rappelle avoir vu un petit objet métallique, mais elle ne sait pas exactement ce qui a été ingéré. L'enfant était asymptotique à l'examen. Comment faut-il identifier et localiser le corps étranger? Les corps étrangers métalliques doivent-ils être enlevés par endoscopie?

Réponse L'ingestion de corps étrangers est très fréquente chez les enfants. Il y a lieu de prendre en considération le type de corps étranger et le site de l'impaction. Une anamnèse précise du patient et la prise de radiographies devraient être utilisées pour localiser et identifier l'objet. Un détecteur manuel de métaux peut aussi servir à localiser des corps étrangers métalliques connus. La plupart des objets métalliques qui passent à travers l'œsophage et se rendent à l'estomac continueront leur passage sans complication. Une perforation de l'intestin, un sepsis et même le décès ont été documentés dans des cas extrêmement rares d'aimants multiples, de piles boutons et d'objets longs, angulaires ou tranchants à 2 pointes. De tels objets doivent être enlevés. D'autres corps étrangers métalliques, comme des pièces de monnaie ou un aimant simple, peuvent être suivis de manière conservatrice, en surveillant les selles.

Foreign body ingestion is common, with most cases occurring in children younger than 3 years of age.¹ Although the exact incidence is unknown, the American Association of Poison Control Centers reported nearly 70 000 foreign body ingestions in children younger than 5 years of age in 2018.² The types of ingested foreign bodies vary and include coins, screws, beads, button batteries, rings, and food, among many others.³ Up to 85% of reported ingestions involve metallic foreign bodies,⁴ and coins are the most frequently ingested, followed by sharp objects (eg, pins, screws, nails), button batteries, and magnets.^{3,5}

Foreign bodies in the stomach tend to pass without complication. However, the rate of obstruction and perforation can rise from less than 1% up to 15% to 35% with ingestion of multiple magnets or of sharp foreign bodies.¹ Foreign bodies in the upper esophagus typically

necessitate urgent removal and are outside the scope of this review.

Clinical assessment

Children with foreign bodies in the stomach are often asymptomatic and are only identified through witness accounts by a caregiver.⁶ During a 15-year period, an emergency department (ED) in Belgium recorded 325 cases, of which 290 were witnessed or foreign body ingestion was strongly suspected by a bystander, 32 cases were unwitnessed, and 3 were discovered by coincidence upon x-ray scan.⁵ Infrequently, gastric foreign bodies might present with symptoms of abdominal pain, vomiting, and hematemesis, predominantly due to sharp objects.⁷ Because of varying presentation, a thorough history is crucial, and the quantity and type of foreign bodies will determine management.^{6,7}

Detection and localization

Primary evaluation of suspected foreign body ingestion includes obtaining radiographs of the abdomen.⁷ In a study involving 1265 ingested foreign bodies in children, radiographs had a 100% detection rate for endoscopically proven metallic foreign objects. Despite the usefulness of radiographs, radiolucent objects and thin metal objects can be overlooked.⁸ For suspected magnets, radiographic studies can help to determine if multiple magnets were ingested or if a magnet was co-ingested with another metallic object.^{6,7,9}

Differentiation between button batteries and coins on radiographs is imperative. Button batteries have the potential to cause caustic injury and mucosal damage. Most button batteries can be distinguished from coins by their halo sign—a double-ring appearance on the outer edge of the battery^{6,7}—or a step-off formed by the narrower negative pole of the battery.⁶

Handheld metal detectors

Handheld metal detectors (HHMDs) are emerging as an effective primary localization tool that is accurate, radiation free, and cost-effective in localizing metallic foreign bodies.^{10,11} In a systematic review of 11 studies with 417 children, HHMDs demonstrated sensitivity of 99.4% (95% CI 98.0% to 99.9%), specificity of 100.0% (95% CI 76.8% to 100.0%), and accuracy of localization of 99.8% for coins.¹¹ The sensitivity decreased to 89% in one study when HHMDs were used to identify any metallic object.¹⁰ Trained emergency physicians and inexperienced medical personnel in the ED reached similar sensitivity and specificity using HHMDs.¹² Given their ease of use, HHMDs might serve well as an early screening tool in primary care clinics.^{10,12}

Management of foreign bodies

Coins. Coins are the most commonly swallowed foreign body,^{3,7} with an estimated incidence of 4.0% (95% CI 3.1% to 5.1%) of children and a mean age of 2.8 years in one parent-completed survey from the United States.¹³ Coins typically pass, and in the absence of symptoms management is conservative.⁷ Parents might consider monitoring stool for 2 weeks.

Button batteries. The American Association of Poison Control Centers reported a 6.7-fold increase in serious or fatal outcomes due to ingested batteries from 2007 to 2009 compared with the 3-year period of 1985 to 1987, with an increase in button battery ingestions,¹⁴ possibly owing to the ingestion of higher-voltage lithium cell batteries.¹⁵ In one series of children who swallowed batteries (n=12), all cases involving lithium button batteries (n=5) resulted in complications, whereas all cases involving alkaline button batteries (n=7) were uncomplicated (P=.001).¹⁵ The small number of children and confounding because of higher voltage and


larger battery size suggest that conservative management is not advisable for alkaline batteries. Furthermore, because in most cases the battery chemistry is unknown, endoscopic removal is recommended.⁶

Magnets. During a 10-year period, an estimated 16386 magnetic foreign body ingestions in children took place in the United States, with an average 75% increase per year and an overall 8.5-fold increase in ED visits owing to magnetic body ingestions from 2002 to 2011.¹⁶ In a retrospective chart review from all Canadian pediatric hospitals, Strickland et al found a similar trend, highlighting that injuries involving multiple magnets jumped from 0 to 19 per 100000 ED visits between 2002 and 2012 (incidence rate ratio of 2.13; 95% CI 1.23 to 3.02).¹⁷ Single ingested magnets are likely to pass spontaneously. When multiple magnets are ingested or a single magnet is co-ingested with a metallic foreign body, consequences such as ischemia, stomach or bowel perforation, and even death have been reported,⁹ with one case series (only 8 patients) suggesting intestinal perforation rates of 50%.¹⁸

An important consideration in pediatric magnet ingestion is rare-earth magnets. These special alloys produce strong magnetic force. They are currently sold as popular “desk toys” for adults, and before product safety regulations they were also found in many children’s toys.¹⁹ These magnets are capable of repositioning intestinal loops and attracting multiple layers of bowel wall.¹⁹ In one reported case of rare-earth magnet ingestion, a 2-year-old died of sepsis before the ingestion was discovered and treated.¹⁹ Another child ingested multiple rare-earth magnets and developed bowel perforation; surgical intervention to remove the magnets resulted in recovery.¹⁹

Sharp metallic objects. Sharp metallic objects pose variable risk for gastric injury. Sharp objects with a blunt heavier end that are less than 6 cm long and 2.5 cm in diameter typically pass without incident because the sharp end trails the blunt end.⁷ Long or angular sharp objects, and objects with 2 sharp ends, pose greater risk for injury and should be monitored carefully.⁷

Conclusion

Metallic foreign body ingestion is common in the pediatric population, mostly among children younger than 3 years of age. Handheld metal detectors and radiographs can be used to localize and identify the foreign body. Objects that reach the stomach are likely to pass without complication. Button batteries, multiple magnets, and long, angular, or 2-pointed sharp objects must be removed to avoid gastrointestinal morbidity. 

Competing interests

None declared

Correspondence

Dr Ran D. Goldman; e-mail rgoldman@cw.bc.ca

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