

Protocol of care for foreign-body ingestion in children: a qualitative study

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SUMMARY

OBJECTIVE: This study aimed to suggest a care protocol for foreign-body ingestion, address the clinical aspects, and identify the ingested object, severity, and professional conduct.

METHODS: This is a qualitative study. We used books and original articles published in national and international journals (BIREME, SCIELO, LILACS, and MEDLINE/PubMed) in Portuguese, Spanish, and English.

RESULTS: The ingestion of a radiolucent object should be evaluated radiographically and with endoscopy for cases with symptoms of impaction and radiolucent objects. Coins are the most commonly involved foreign bodies. In asymptomatic patients, it often requires only a conservative form of management. Ingestion of batteries, magnets, and sharp objects carries a high risk of serious clinical complications and should have an endoscopic or surgical approach. In view of this, each pediatric emergency service, based on these recommendations, has the possibility to develop an individual protocol to identify and remove the ingested foreign body.

CONCLUSIONS: Protocol of care for foreign-body ingestion in children depends on the object ingested, time of ingestion, symptoms, and local epidemiological context. This study provides some suggestions for decision-making in the conduct of health professionals.

KEYWORDS: Pediatrics. Accidents, home. Emergency medical services. Public health.

INTRODUCTION

Foreign-body ingestion is a common complaint in children's emergency medical services. It usually has an accidental etiology; however, it can be intentional and deliberate. The first description of accidental foreign-body ingestion occurred in 1692, when the 4-year-old Crown Prince of Brandenburg, Frederick the Great, swallowed a shoe buckle. The types of foreign bodies are very varied. In the United States, coins are the most accidentally ingested objects, while in China and other Eastern countries, fish bones and bones of animals served as food are the most common foreign bodies in emergencies¹.

Although foreign-body ingestion is common in emergency medical services, there are no care protocols for this clinical scenario. This study aimed to suggest a care protocol for foreign-body ingestion, address the clinical aspects, and identify the ingested object, severity, and professional conduct.

METHODS

This is a qualitative study performed in accordance with the Standards for Reporting Qualitative Research (SRQR). We searched in books and scientific articles that analyzed foreign-body ingestion in pediatrics. As inclusion criteria, full original articles were used, published in the period from 2000 to 2019 (Portuguese, Spanish, and English). As exclusion criteria, incomplete articles were considered, which did not cover the specific theme and were duplicated in the databases.

We retrieved the articles through the following databases: BIREME, SCIELO, LILACS, and MEDLINE/PubMed. We used the descriptors: "corpos estranhos," "accidentes domésticos," "pediatria" (in Portuguese); "cuerpo extraño," "accidentes domésticos," "pediatria" (in Spanish); and "foreign bodies," "Accidents, Home," "pediatrics" (in English).

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RESULTS

Most cases of foreign-body ingestion in pediatrics occur unintentionally. About 98% of cases occur unintentionally². North American data show that more than 110,000 foreign bodies were ingested in the United States in 2011, with more than 85% occurring in the pediatric population³. This condition is widely associated with infants and young children, with a peak between the ages of 6 months and 3 years⁴. Other studies conducted outside the United States have also confirmed the peak incidence of foreign-body ingestion in children between the ages of 6 months and 6 years, with an equal distribution between boys and girls⁵.

In a retrospective study between the years 2010 and 2013, including children under 14 years old, in a pediatric urgency and emergency hospital in Spain, it was found that of the 226,666 consultations, 1608 were for suspected foreign-body ingestion and 970 cases of ingestion mainly of fish bones or coins, among children aged 4.7 years and with slight male predominance (53.9%)⁶.

In Brazil, according to data from DATASUS, between January 2010 and December 2019, there were 33,408 hospitalizations for the treatment of “penetration effects of foreign-body ingestion in a natural orifice” in children aged under 9 years, with a predominance of the middle-aged (1–4 years) group. However, there is no way to discriminate, from the data provided by the system, the type of foreign body, as well as the anatomical location of diagnosis, which makes some public policy difficult due to a lack of epidemiological diagnosis (Figure 1).

DISCUSSION

In Brazil, Inmetro tests regulate and inspect the quality of products, among which are children’s toys, produced in the country or imported in terms of quality, durability, indication of age group, and risk of accidents. With this protective purpose, the Brazilian Society of Pediatrics created in 1998 the national campaign to prevent accidents and against violence in childhood and adolescence, covering guidance to health professionals through scientific documents.

Most ingested objects pass through the gastrointestinal tract without causing injury; however, they can be lodged in any part of the gastrointestinal tract, which can cause mucosal damage, obstruction, and even perforations. Of inadvertently ingested objects, 10–20% require endoscopic removal, with less than 1% requiring open surgical intervention⁷.

The incidence of impaction of foreign bodies varies from 2–15%. The most common regions of these impactions are the cricopharyngeal area, the middle third of the esophagus, lower esophageal sphincter, pylorus, and ileocecal valve. Children may be particularly vulnerable to foreign bodies retained in the esophagus due to their small diameter compared to adolescents and adults⁸.

Some anatomical and functional conditions of the esophagus and gastrointestinal tract predispose to greater retention of the ingested object, such as strictures, rings, esophageal dysmotility, achalasia, dysphagia, history of esophageal atresia, tracheoesophageal fistula, or previous gastrointestinal tract surgery³.

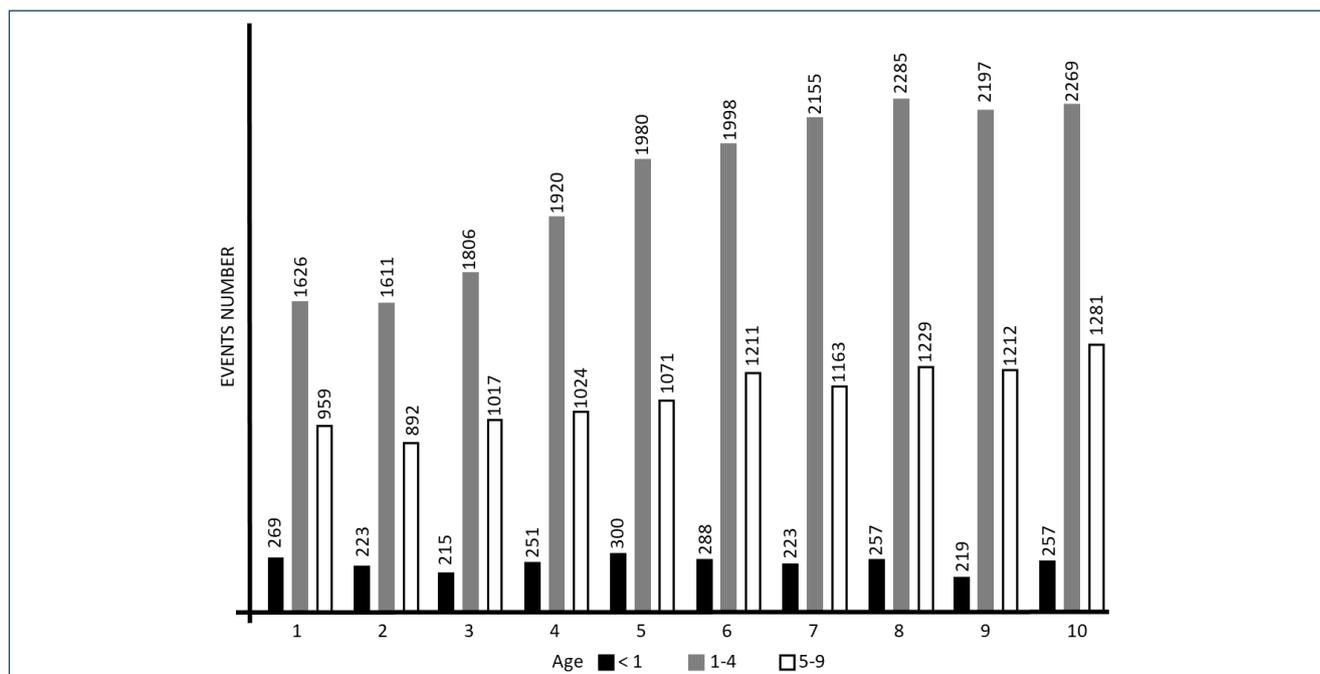


Figure 1. Age group as a function of years.

In particular, batteries, magnets, caustic liquids, and sharp objects pose a significant risk for complications and should have an emergent assessment and, if possible, early removal^{3,7}. It is essential to rule out the possibility of ingesting batteries, as their electrical charge can react with saliva, increasing the risk of perforation and requiring emergency removal^{7,9}. Severe damage can occur in less than 2 h after esophageal battery impaction^{9,10}.

Clinical characteristics after foreign-body ingestion

A variety of signs and symptoms have been widely reported in children following ingestion or aspiration of a foreign body; approximately half of the children who ingest foreign bodies remain asymptomatic⁶. When symptoms are present, they are often nonspecific and are based on the type of foreign body, location of the obstruction, the size of the object, and the duration of impaction, promoting more significant symptomatology when they injure or impact the esophagus; older children or adults may complain of odynophagia and sore throat. Babies may experience vomiting, drooling, or cough¹¹.

There may be symptoms such as fever, recurrent pneumonia due to bronchoaspiration, and even stunting if the object is impacted for a prolonged period in the esophagus¹². A recent case, described by Mancone et al.¹³, reports a clinical condition of a 3-year-old child with dysphagia for 1 year, associated only with hypersalivation and progressive weight loss. The patient was evaluated by several pediatricians, who attributed the signs and symptoms to a clinical condition of severe reflux, leading to repeated attempts at antacid therapy, without clinical improvement. With a radiography, the diagnosis of chronic esophageal impaction was made after unwitnessed foreign-body ingestion.

Akingbola et al.¹⁴ reported an unprecedented case of movement disorder and lethargy in a 10-month-old infant after foreign-body ingestion (medium-sized rock gravel). The authors concluded that foreign-body ingestion in children may mimic intussusception or occult central nervous system disease. Therefore, a hypothesis of foreign-body ingestion in a child with an acute onset of movement disorder and lethargy is necessary.

Diagnosis

Physical examination is normal in most children with foreign-body ingestion (airway and breathing should be evaluated initially)⁶; abnormal findings may include neck swelling or crepitus, suggesting possible esophageal perforation⁵, and inspiratory or expiratory stridor, suggesting the possibility of obstruction.

The symptoms of obstruction, erosion, or perforation in the stomach or intestine are abdominal pain, nausea, vomiting,

fever, hematochezia, or melena, and it is possible to observe pneumoperitoneum radiographic images, inadequate gas distribution, and distention of loops with liquid level¹⁵. The diagnosis of foreign-body ingestion is based on three important elements: eyewitness reports obtained from anamnesis, radiographs, and endoscopic findings. Radiographs must be obtained to locate and characterize foreign-body ingestion^{7,16}.

However, many sharp objects are not visible on an x-ray, so endoscopy can be performed in view of the patient's complaint and symptoms, even if the x-ray is negative³. Digestive endoscopy is considered a diagnostic and therapeutic technique⁶. Ultrasonography is an accurate modality in the detection of radiolucent foreign body. Emergency physicians can be trained to provide a degree of accuracy comparable to more experienced sonographers¹⁷.

Nation and Jiang¹⁸ propose an emergency foreign-body removal protocol that uses a portable metal detector as a screening tool in order to shorten the waiting time for the operating room or hospital discharge, in addition to minimizing exposure to radiation in children, avoiding repeated x-rays.

The batteries appear on radiography as a peripheral double density in the anteroposterior view or as a slanted edge in a lateral view. Ingested magnets must be evaluated with several radiographic views because if two magnets are ingested together, which is particularly dangerous, they can give the false impression of just one magnet in a single view¹⁹.

Management of the foreign body in the pharynx or esophagus

Objects in the oropharynx can often be removed under direct laryngoscopy. Therefore, an asymptomatic child with an esophageal coin, having no underlying abnormalities of the esophagus and trachea, can be observed for 8–24 h with a repeat radiograph²⁰. The incidence of esophageal perforation by an impacted foreign body is 2–15%. Foreign bodies in the hypopharynx are not easily removed. There can be disastrous consequences of this impaction when large enough to obstruct the esophagus, larynx, or lower respiratory tract, causing vomiting, suffocation, or death¹¹.

In the same way, sharp objects such as chicken bones, fish bones, pins, razor blades, needles, and toothpicks, among others, present a greater risk of perforation of the gastrointestinal tract. These deserve special care^{3,20} and must be removed within 2 h if patients are symptomatic⁴.

Management of foreign bodies in the stomach

Most of the foreign objects in the stomach or duodenum pass through the gastrointestinal tract uneventfully. Considering the risk

of complications, they should be removed endoscopically, if possible. Due to the evolution and increased awareness of the usefulness of upper digestive endoscopy in children, endoscopic removal of foreign-body ingestion can be considered an option, in addition to the traditional method of waiting for spontaneous passage³.

The NASPGHAN Endoscopy Committee recommends removing the battery or magnets from the gastric cavity within 2 h in symptomatic children, regardless of the size of the foreign body. Regarding swallowed coins, expectant treatment can be performed or removed within 24 h if they cause gastric symptoms⁴. Table 1 describes some recommendations from the NASPGHAN Endoscopy Committee.

The experiment carried out by Anfang et al.²¹ suggests that, between the ingestion of the battery and the specialized evaluation by the physician, honey or Carafate should be given to the patient, as they have the potential to reduce the severity of injuries if the battery is retained in the esophagus. Honey is a weak acid, with a sweet and viscous taste found in most homes. It provides additional protection acting as a physical barrier, given its high consistency; however, it should not be used in children aged under 1 year. Carafate suspension is a weak acid, approved by the Food and Drug Administration for the treatment of duodenal ulcers, but not available in the Brazilian market.

Management of foreign body in the intestine

Most foreign bodies in the small intestine pass spontaneously without complications. Therefore, caregivers should be advised to check for foreign-body ingestion in children's stools. If the

object is not eliminated within a week, it is necessary to obtain an x-ray to identify the precise location of the swallowed foreign body²². However, a less liberal approach would be to follow the object with serial radiographs and, if it does not move distally within 24 h, consider intervention for removal²³.

If a single magnet has been ingested, it can be followed up conservatively, followed by serial radiographs²⁴. A laxative solution, such as PEG 3350 (polyethylene glycol), can be used to help intestinal transit and magnet exit^{3,19}. Ingestion of multiple magnets is very dangerous because they can attract each other through the intestinal walls, leading to pressure necrosis, intestinal ulceration and perforation, and fistula formation²⁴.

If the magnets were past the stomach and the patient is asymptomatic (no sign of obstruction or perforation), the magnets should be removed by enteroscopy or colonoscopy²⁴. Symptomatic cases with vomiting, severe abdominal pain, intestinal bleeding, or fever should be evaluated by the pediatric surgery team^{3,19}.

The protocol of care for foreign-body ingestion in children, based on a literature scan, is available and can be downloaded at link (<https://drive.google.com/file/d/1osGdaXY5HwzySxNKA2RMGLBLZTeNWyk9/view>).

CONCLUSIONS

Protocol of care for foreign-body ingestion in children depends on the object ingested, time of ingestion, symptoms, and local epidemiological context. This study provides some suggestions for decision-making in the conduct of health professionals.

Table 1. Endoscopic intervention after foreign-body ingestion.

Object	Localization	Symptomatology	Removal
Currency	Esophagus	Yes No	Immediate Mediate
	Stomach	Yes No	Mediate Elective
Battery	Esophagus	Independent	Immediate
	Stomach	Yes No	Immediate Mediate
Magnet	Esophagus	Yes No	Immediate Mediate
	Stomach	Yes No	Immediate Mediate
Pointed foreign body	Esophagus	Independent	Immediate
	Stomach	Yes No	Immediate Mediate
Large foreign body	Esophagus	Independent	Mediate
	Stomach	Independent	Mediate

Immediate <2 h; Mediate <24 h; Elective >24 h; Large foreign body >2 cm.

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