

Foreign body ingestion in children: unusual presentations and timely intervention

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Background/purpose Foreign body (FB) ingestion in children is very common. Children can ingest a wide variety of FBs. Most of the ingested FBs pass spontaneously through the gastrointestinal tract. Other FBs, especially uncommonly ingested objects, can present with complications and need intervention to be extracted. The aim of this study was to highlight the importance of timely intervention to extract these FBs.

Patients and methods Between November 2012 and October 2017, patients who presented to our department with variously ingested FBs were retrospectively reviewed to detect those who needed intervention (surgical or endoscopic) to extract these FBs.

Results During the specified time period, 480 patients with FB ingestion presented to our department. Out of these children, 12 patients ingested uncommon FBs or presented with symptoms of complications of impaction and needed intervention to extract these FBs. Three patients ingested multiple magnets. Three patients ingested pins which were impacted in and penetrated the duodenum. One patient ingested a screw which was impacted in the appendix. One patient ingested a sticky rubber toy which was impacted in the pylorus. One patient ingested hair (bezoar), which was also impacted in the pylorus. One

patient ingested a disk battery which was impacted in and penetrated the esophagus, and all were surgically extracted. One patient had a slipped stent of repaired choanal atresia which was impacted in the gastroesophageal junction and one patient with repaired tracheoesophageal fistula ingested a stone which was impacted at the site of esophageal anastomosis, and both were endoscopically retrieved.

Conclusion Children who ingested uncommon FBs or presented late with symptoms of complications of impaction needed intervention (surgically or endoscopically) to extract these FBs. *Ann Pediatr Surg* 14:157–160 © 2018 Annals of Pediatric Surgery.

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Introduction

Foreign bodies (FBs) ingestion is common in children. The American Association of Poison Control Centers reported 70 000 pediatric FB ingestion in 2014 [1]. Children ingest FBs due to curiosity affected by their natural cognitive development and the peak of age incidence is between 6 months and 3 years [2,3].

The commonly ingested FBs are coins, toy parts, jewelry, needles, batteries, and fish bones. Most of these ingested FBs pass spontaneously through the gastrointestinal tract without consequences [4].

The clinical manifestations of FBs' ingestion in children can vary widely according to the site of impaction, the type of the ingested FB, and the age of the child [5]. The most commonly presenting symptoms are drooling, dysphagia, odynophagia, vomiting, or symptoms of complications [6]. Some of these FBs, especially those which are uncommonly ingested, impact in a part of the gastrointestinal tract and need intervention to be extracted [7].

In this study, we aimed to highlight the importance of timely intervention to extract uncommonly ingested FBs and impacted FBs in patients presenting with symptoms of complications.

Patients and methods

Between November 2012 and October 2017, after approval of the Internal Review Board, patients presented

to Pediatric Surgery Department, Ain Shams University with variously ingested FBs were retrospectively reviewed to detect those who ingested uncommon FBs or presented with symptoms of complications of impaction.

The study was approved by our ethics committee and individuals gave informed consent to participate in the study.

Results

During the specified period, 480 patients presented to our department with FB ingestion. Their age ranged between 6 months and 8 years (mean: 4.2 years). Out of these 480 children, 12 (2.5%) children ingested uncommon FBs or presented with symptoms of complications of impaction.

Surgical exploration was performed in 10 (83%) cases. The indication for surgery was to extract the magnets in three (30%) patients, to extract the pins penetrating the duodenum in three (30%) patients, a diagnosis other than FB ingestion in three (30%) patients (acute appendicitis and gastric outlet obstruction), and to extract the disk battery penetrating the esophagus in one (10%) patient, whereas endoscopic retrieval was possible in two (17%) patients with the slipped stent and the stone.

Three patients ingested multiple magnets. They were a 3-year-old girl, and 4-year and 7-year old boys and they sought medical advice 1 month, 12 h, and 1 day after ingestion, respectively. The magnets were seen in the abdominal radiography. The magnets were attracted to

each other compressing bowel loops in between and the children presented with a picture of intestinal obstruction in the two boys and with chronic diarrhea in the female child. The three patients were explored after resuscitation; the compression resulted in intestinal fistulae in one patient. The magnets were extracted and the fistulae were closed in this patient, whereas the magnets were milked to the anus in one patient and were extracted through enterotomy in the third patient (due to its large size and attachment to other metallic objects). Leakage occurred in the patient with closed fistula 4 days after the operation, so ileostomy was done which was closed 6 weeks later. The other two patients did well and were discharged on postoperative day 6 and 3, respectively (Fig. 1).

Three patients ingested pins. They were 5-year, 7-year, and 8-year old girls and they sought medical advice 2 weeks, 5 days, and 1 week after ingestion, respectively. In the radiograph the pins were seen in the right upper quadrant and the children presented with abdominal pain. A trial of endoscopic retrieval of the pins was done but failed. So, surgical exploration was done and the pins were found penetrating the second part of the duodenum. They were extracted and the duodenum was closed. The children did well and was discharged on postoperative day 5, 6, and 8, respectively.

One patient ingested a screw. He was a 5-year-old male and presented with a picture of acute appendicitis of 3 days duration. On exploration, the screw was found

Fig. 1



A 7-year-old boy presented after few hours of multiple magnets ingestion. (a) Plain abdominal radiograph showing two magnets in the lower abdomen; (b) enterotomy was done to extract the magnets; (c) the extracted magnets with attached metallic objects.

Fig. 2



Plain abdominal radiograph of a 3-year-old boy with impacted sticky rubber toy in the pylorus causing gastric dilatation.

impacted in the base of the appendix obstructing it with suppurative inflammation and impending rupture of its tip. It was extracted and appendectomy was done. The child did well and was discharged on the third day postoperatively.

One patient ingested a sticky rubber toy. He was a 3-year-old boy. The patient was referred to our department because of persistent nonbilious vomiting of 2 weeks duration. Radiographs showed dilated stomach with scanty aeration representing a picture of gastric outlet obstruction. On exploration, the toy was found impacted in the pylorus closing it. The toy was extracted through gastrotomy. The child did well and was discharged on the fifth day postoperatively (Fig. 2).

An 8-year-old girl, known to have a psychiatric disorder, presented with a picture of gastric outlet obstruction. Nothing specific could be seen in the radiograph except a hugely dilated stomach. On exploration, a tuft of hair (bezoar) was found impacted in and obstructing the pylorus. The hair was extracted and the stomach was closed. The child did well and she was discharged on postoperative day 4.

A 3-year-old boy presented with respiratory tract infection. Chest radiography showed a radiopaque disk shadow about 1 cm in diameter. The parents could not remember a history of battery ingestion. Esophageal endoscopy was negative except for mild esophagitis in the middle of the esophagus. On exploration, via thoracotomy, the battery was found penetrating the wall of the esophagus and adherent to the surrounding structures. The battery was extracted and the esophagus was closed. The patient did well and was discharged on postoperative day 9.

Fig. 3



Plain abdominal radiograph of a neonate with slipped nasal stent of repaired choanal atresia showing the stent in the stomach.

A 2-week-old boy in the neonatal intensive care unit had a slipped nasal stent after repaired choanal atresia. In the radiograph, the stent was seen in the lower esophagus. On endoscopy, the stent was seen in the gastroesophageal junction and was retrieved using a rigid esophagoscope (Fig. 3).

A 4-year-old mentally retarded male patient with repaired esophageal atresia and tracheoesophageal fistula ingested a stone while playing. He came few hours after ingesting it with absolute dysphagia. In the radiograph, the stone was seen between the upper and the middle third of the esophagus. On endoscopy, it was impacted at the site of the previous esophageal anastomosis. The stone was retrieved endoscopically by passing a foley catheter behind the stone, then the balloon was inflated and withdrawn slowly to retrieve the stone through his mouth and the patient was discharged 6 hours later.

Discussion

FB ingestion in children is very common. The vast majority of these FBs pass spontaneously through the gastrointestinal tract with no symptoms. Other FBs do not follow this rule. They become impacted in a part of the gastrointestinal tract and begin to cause clinical manifestations. The child may come with symptoms and signs due to the complications of FB impaction without clear history of FB ingestion [8,9]. The impaction of the FB can be life threatening, if prompt management was not done [10].

Ingestion of multiple magnets is associated with intestinal necrosis and fistula formation. Although it is not a commonly ingested FB, its use is increasing and the incidence of their swallowing is on the rise [11,12]. On the other hand, single magnet can pass spontaneously

without consequences, if not combined with ingestion of a metallic object [2].

Button batteries ingestion needs special precautions as if they are lodged in the esophagus, liquefactive necrosis and fatal complications can happen. So, they should be emergently extracted [13]. Impacted batteries in the esophagus can present with respiratory symptoms like stridor and chronic chest infection due to tracheal compression [14]. On the other hand, if the battery is moving through the gastrointestinal tract without being impacted, expectant management can be applied [15].

Other FBs such as toy parts and even sharp objects can pass spontaneously through the gastrointestinal tract without causing clinical manifestations or needing intervention to extract them. However, a predisposing factor like previous gastrointestinal tract surgery or congenital gut malformation causing its narrowing can lead to its impaction and hence the appearance of complications and the need for intervention [16–18]. Some authors found that the presence of gut malrotation in a child who ingested atypical FBs resulted in serious consequences which required urgent surgical intervention [8].

In our series, the uncommonly ingested FBs (magnets, sticky rubber toy, and stone) needed extraction as they impacted in a part of the gastrointestinal tract. The other FBs (pins, screw, and battery), although common, they could not pass spontaneously. They impacted and caused complications. So, extraction of these FBs was necessary. The incidence for surgical intervention to extract the ingested FBs was 2% (10/480), which is slightly higher than that reported in the literature (1%) [3,14]. The indication for surgical intervention, as stated in most of the articles, was due to the occurrence of complications or due to failure of endoscopic retrieval.

Conclusion

Children who ingested uncommon FBs or presented late with symptoms of complications of impaction needed intervention (surgically or endoscopically) to extract these FBs.

Conflicts of interest

There are no conflicts of interest.

References

- Mowry JB, Spyker DA, Brooks DE, McMillan N, Schauben JL. 2014 annual report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 32nd Annual Report. *Clin Toxicol (Phila)* 2015; **53**:962–1147.
- Alzahem AM, Soundappan SS, Jefferies H, Cass DT. Ingested magnets and gastrointestinal complications. *J Paediatr Child Health* 2007; **43**:497–498.
- Lee JH, Lee JS, Kim MJ, Choe YH. Initial location determines spontaneous passage of foreign bodies from the gastrointestinal tract in children. *Paediatr Emerg Care* 2011; **27**:284–289.
- Naji H, Isacson D, Sevansson JF, Wester T. Bowel injuries caused by ingestion of multiple magnets in children: a growing hazard. *Pediatr Surg Int* 2012; **28**:367–374.
- Arana A, Hauser B, Hachimi-Idrissi S, Vandenplas Y. Management of ingested foreign bodies in childhood and review of the literature. *Eur J Pediatr* 2001; **160**:468–472.
- Liming BJ, Fischer A, Pitcher G. Bronchial compression and tracheoesophageal fistula secondary to prolonged esophageal foreign body. *Ann Otol Rhinol Laryngol* 2016; **125**:1030–1033.
- Palta R, Sahota A, Bemarki A, Salama P, Simpson N, Laine L. Foreign-body ingestion: characteristics and outcomes in a lower socioeconomic population with predominantly intentional ingestion. *Gastrointest Endosc* 2009; **69** (Pt 1):426–433.
- De la Fuente SG, Rice HE. Ingestion of unusual foreign bodies and malrotation: a 'perfect storm'. *Pediatr Surg Int* 2006; **22**:869–872.
- Lai AT, Chow TL, Lee DT, Kwok SP. Risk factors predicting the development of complications after foreign body ingestion. *Br J Surg* 2003; **90**:1531–1535.
- Sardana P, Bais AS, Singh VP, Arora M. Unusual foreign bodies of the aerodigestive tract. *Indian J Otolaryngol Head Neck Surg* 2002; **54**:123–126.
- Macedo M, Velhote M, Maschietto R, Waksman R. Intestinal fistula after magnets ingestion. *Einstein (Sao Paulo)* 2013; **11**:234–236.
- Hussain S, Bousvaros A, Gilger M, Mamula P, Gupta S, Kramer R, Noel R. Management of ingested magnets in children. *J Pediatr Gastroenterol Nutr* 2012; **55**:239–242.
- Smith MT, Wong RK. Esophageal foreign bodies: types and techniques for removal. *Curr Treat Options Gastroenterol* 2006; **9**:75–84.
- Aihole JS, Kumar P. Uncommon presentation of an unusual foreign body. *Indian J Crit Care Med* 2017; **21**:460–462.
- Cowan SA, Jacobsen P. Ingestion of button batteries. Epidemiology, clinical signs and therapeutic recommendations. *Ugeskr Laeger* 2002; **164**:1204–1207.
- Gretarsdottir HM, Jonasson JG, Björnsson ES. Etiology and management of esophageal food impaction: a population based study. *Scand J Gastroenterol* 2015; **50**:513–518.
- Alrazzak BA, Al-Subu A, Elitsur Y. Etiology and management of esophageal impaction in children: a review of 11 years. *Avicenna J Med* 2013; **3**:33–36.
- Williams P, Jameson S, Bishop P, Sawaya D, Nowicki M. Esophageal foreign bodies and eosinophilic esophagitis – the need for esophageal mucosal biopsy: a 12-year survey across pediatric subspecialties. *Surg Endosc* 2013; **27**:2216–2220.