

Swallowed Foreign Bodies in Children: Report of Four Unusual Cases

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Abstract

Introduction: Although a majority of ingested foreign bodies (FBs) pass down the gastrointestinal tract spontaneously, those that are sharp, pointed or large in size need removal to avert serious complications. We highlight the urgent need and utility of endoscopic accessories and technical artistry in safe retrieval of FBs in children. **Clinical Picture:** Four children had accidentally swallowed a nail, metallic dumbbell, open safety pin and a cushion pin respectively. They were symptom-free and the abdominal plain radiographs revealed foreign body in the stomach in all the cases. **Treatment:** Oesophago-gastro-duodenoscopy (OGD) was done in all the patients and could retrieve the nail, metallic dumbbell and open safety pin successfully using a Dormia basket, a polypectomy snare and a pair of rat-tooth forceps respectively. The cushion pin had migrated to the duodeno-jejunal junction within 4 hours of ingestion and necessitated open duodenotomy and retrieval. **Outcome:** All patients did well after the procedure with no complications. **Conclusions:** Swallowed FBs with pointed or sharp ends or large enough to cross the pylorus and duodenal sweep need removal and in the majority of the cases they can be retrieved by OGD. Sharp or pointed FBs that have crossed the second part of the duodenum necessitate urgent laparotomy for retrieval to prevent complications.

Ann Acad Med Singapore 2006;35:49-53

Key words: Complications, Ingestion, Treatment

Introduction

Foreign body (FB) ingestion in children is a frequent and frightening experience to the patients and caregivers. It is a common paediatric problem necessitating occasional immediate intervention to avoid serious complications. Fortunately, a majority of the ingested FBs pass spontaneously down the gastrointestinal tract without untoward effects. FBs that are too large to cross the pylorus and duodenal sweep need removal and in the majority of the cases can be retrieved by flexible oesophago-gastro-duodenoscopy (OGD). Sharp and pointed FBs pose a constant hazard and entail immediate intervention to prevent inadvertent complications. We present the utility of various endoscopic accessories and technical artistry as well as the emergent need to retrieve sharp and large FBs in children.

Case Reports

Case 1

A 6-year-old girl was admitted with a 2-hour history of accidental ingestion of an iron nail. She was asymptomatic

and the nail was seen in the stomach on the abdominal plain radiograph (AXR) (Fig. 1). OGD was done and the nail measuring 6 cm in length was removed using a Dormia basket after failed attempts to hold it with a pair of rat-tooth grasping forceps (Fig. 2). The head of the nail was engaged within the Dormia basket and the nail was removed with the pointed end facing downwards. The postoperative recovery was uneventful.

Case 2

An 8-year-old boy presented with a 4-day history of accidental ingestion of a metallic dumbbell while playing. He was symptom-free and the AXR revealed the presence of FB in the stomach (Fig. 3). On OGD, a metallic dumbbell of length 6 cm with rounded smooth ends measuring 1.5 cm and 0.75 cm in diameter was found within the stomach (Fig. 4). The dumbbell was difficult to hold with conventional graspers due to its size and slippery smooth surface. The narrower end of the dumbbell was engaged within a polypectomy snare and retrieved with the bulkier end

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Fig. 1. Abdominal plain radiograph (AXR) showing metallic nail in the stomach.

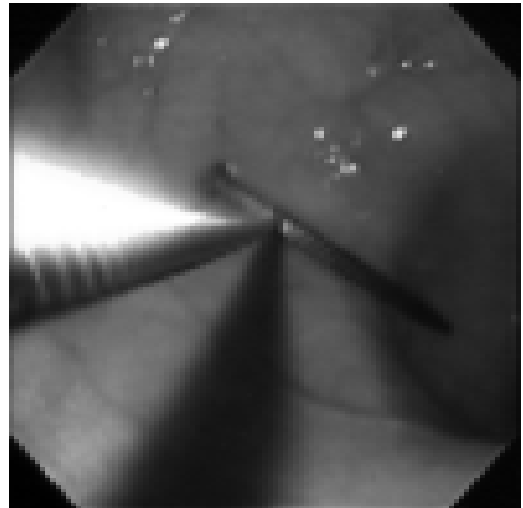


Fig. 2. Endoscopic view of the metallic nail in the stomach.

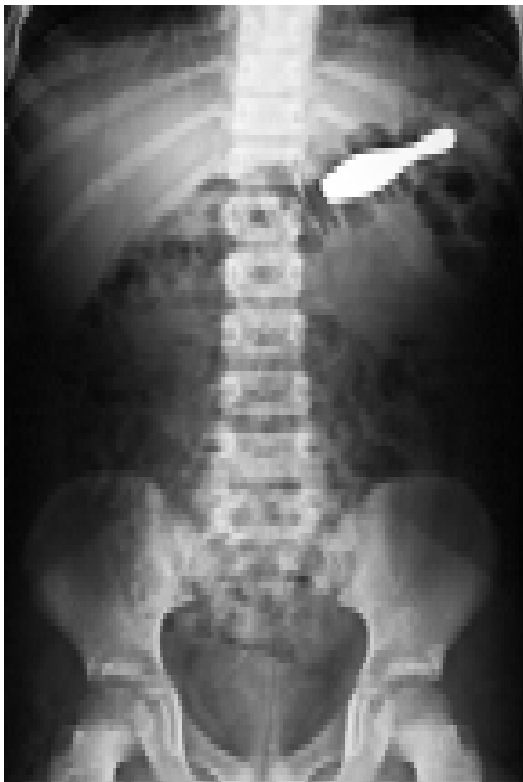


Fig. 3. AXR showing metallic dumbbell in the stomach.

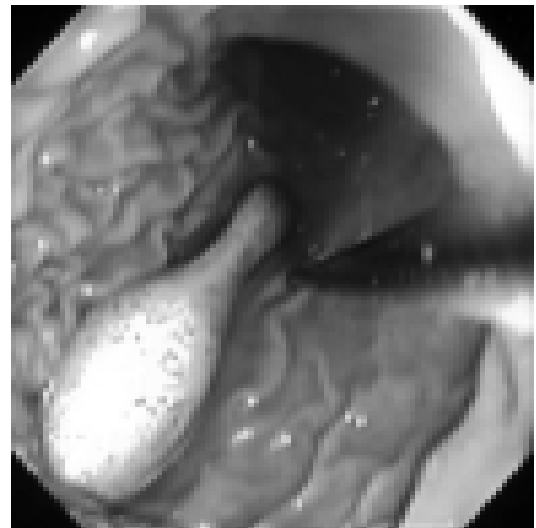


Fig. 4. Endoscopic view of the metallic dumbbell in the stomach.

trailing behind. The post retrieval recovery was unremarkable.

Case 3

A 13-year-old boy had swallowed a cushion pin accidentally 2 hours prior to admission. He was asymptomatic and the needle was seen in the stomach on AXR (Fig. 5). On OGD, the needle was not visualised after inspection of the stomach and the duodenum unto the third part. Per-operative AXR showed that the needle had migrated (Fig. 6). Conversion to laparotomy was done, and the needle was found to be wedged at the duodeno-jejunal junction. Stab duodenotomy was done to retrieve the



Fig. 5. AXR showing long cushion pin with radiolucent head in the stomach (at reception).



Fig. 6. AXR showing long cushion pin with radiolucent head in the duodeno-jejunal junction (at surgery).



Fig. 7. AXR showing open safety pin in the stomach.

needle which had a translucent head and measuring 5 cm in length. The postoperative recovery was smooth and the patient was discharged on the fifth postoperative day.

Case 4

A 6-month-old girl presented with a 2-hour history of accidental ingestion of a safety pin (SP). The child was

asymptomatic and an open SP was noticed in the stomach on AXR (Fig. 7). On OGD, the SP was seen in the first part of the duodenum. The circular smooth spring end was grasped with a pair of rat-tooth grasping forceps and the SP was removed under vision with its pointed end trailing behind. The child tolerated the procedure well without untoward effects.

Discussion

Unintentional ingestion of FBs is a widespread problem that befalls children and adults alike, but the management is not standardised among the various specialties and subspecialties of physicians who care for these patients. The majority of cases occur in children aged between 6 months and 3 years.^{1,2} Coins, marbles, pins, keys, toys, button batteries, stones, nails and rings are some of the common FBs ingested by children. Accidental ingestion is the most common cause in children. Mental disorders, bulimia and alcohol consumption are the other contributing factors in adults.³

The majority of ingested FBs that reach the stomach pass uneventfully through the gastrointestinal tract and the overall risk of perforation is 1%.⁴ Endoscopic removal is needed in 10% to 20% of the cases and in about 1% of the cases, surgical intervention is required, depending on the nature, shape, size, number and location of the FBs.^{3,4} In

general, the indications for FB removal in children include all oesophageal FBs, FBs in the stomach that is sharp, pointed or toxic, blunt FBs more than 4 cm in length and 2 cm in diameter and presence of non-toxic blunt FBs for 2 weeks in the stomach or 1 week in the duodenum.⁵

Non-toxic blunt FBs smaller than 4 cm x 2 cm can be safely observed for spontaneous passage except with ingestion of multiple magnets, where it risks intestinal perforation and fistulisation due to magnets being attracted to one another and hence necessitates removal before they pass beyond the reach of the endoscope.²

Sharp or pointed FBs necessitate urgent removal as they can lead to deleterious complications associated with the unpredictable migration. They should be removed before they cross the stomach as 15% to 35% of them can cause intestinal perforation.⁴ The most common site of perforation is the oesophagus, but other sites such as pylorus, duodenum, duodenojejunal flexure, ileocaecal junction, Meckel's diverticulum, or previous surgical site are also prone to perforation due to FB impaction.⁶ Various other complications of ingested sharp or pointed FBs such as eyeliner pencil causing stomach and diaphragmatic perforation and empyema,⁷ toothpick causing hepatic inflammatory mass,⁸ small bowel perforation due to a nail⁹ and sewing needle-induced appendicitis¹⁰ have been described. In our patient, potential complications of the lodged cushion pin were averted by its timely removal.

Open SP ingestion or inhalation is a technical challenge to surgeons due to the propensity for perforation and serious consequences. Various complications such as rupture of the common carotid artery, aortic pseudoaneurysm, oesophago-aortic fistula, pericarditis and cardiac tamponade have been described in association with ingested open SP.^{11,12} Other interesting rare complications such as SP forming the nidus for an appendiceal calculus,¹³ irreducible inguinal hernia due to colonic perforation in the congenital hernial sac¹⁴ and duodeno-colic fistula¹⁵ have been reported. Although there is an anecdotal case report of peristaltic closure of an open SP and safe passage through the gastrointestinal tract, urgent removal is necessary to prevent the complications.¹⁶ The endoscopic retrieval of an open SP is technically demanding and various manoeuvres such as endoscopic closure of the SP within the stomach using a polypectomy snare, removal after engaging the pointed end within the grasping forceps or retrieval by holding the rounded spring end with a pair of rat-tooth forceps have been described.¹⁷ Gun et al¹² in their series of 49 patients with open SP ingestion found that 20 (41%) passed the SP spontaneously, 14 (28.5%) needed endoscopic removal (all oesophageal SP) and 15 (30.5%) required surgical intervention for removal of the SP. Endoscopy was attempted for only oesophageal SP and

those that had reached the stomach were left alone for spontaneous passage. Fifteen of these SP (42.8%) needed surgical intervention for retrieval. This series reiterates the need for emergent endoscopic removal of open SP, as they cannot pass down the gastrointestinal tract safely.

Our report highlights the unusual forms of FB ingestion in relatively older children and also in an infant. Coins, button batteries and plastic toys are some of the common ingested FBs encountered in our practice. The magnitude of the problem is difficult to estimate as vast majority of the cases are observed as outpatients. Button batteries represent a special category of paediatric ingested FBs because of the possibility of serious complications, particularly if impacted in the oesophagus or anywhere in the gastrointestinal tract as it can damage surrounding tissues due to electrochemical reactions which may lead to oesophageal perforation, tracheo-oesophageal fistula, gut perforation and other serious problems. With the exception of impacted FBs in the oesophagus, these FBs are usually observed for spontaneous passage down the gastrointestinal tract. In the past 3 years, we have not experienced any cases of intestinal obstruction or other complications associated with the above-mentioned FBs that have crossed the pylorus.

Endoscopy under general anaesthesia is safe and effective in removing FBs in children but demands innovation, accessory instrumentation and skilful application of endoscopic techniques. A dry run on a simulated FB with various available instruments aids in the appropriate choice of technique to extract the FB. The nail in the stomach was removed by engaging the head of the nail within the dormia basket, after failed attempts to hold it with a pair of rat-tooth forceps, and pulled out with the pointed end trailing. In the case of the metallic dumbbell, its narrower end was engaged in a polypectomy snare and retrieved with the bulkier smooth end trailing behind. The open SP seen in the duodenum was removed by holding the circular spring end with a pair of rat-tooth forceps, the pointed end facing downwards. Although this technique poses the risk of oesophageal perforation and a case of aortic pseudoaneurysm following removal of open SP has also been described, gentle techniques and removal under vision can safeguard against perforation.¹⁷ The use of protective over tubes has been described for safe removal, but over tubes for use with paediatric endoscopes are not available and hence this technique is impractical in the paediatric age group. Double channel flexible endoscopes provide access for manipulation with 2 instruments and aid in closure of the pin for safe extraction.

Although all our patients underwent emergency OGD following admission to hospital, we could not retrieve the cushion pin endoscopically as it had migrated to the duodeno-jejunal junction within 4 hours of ingestion. This

necessitated laparotomy and the cushion pin was found lodged at the duodeno-jejunal flexure and was retrieved through duodenotomy. This case illustrates the potential complications of needle migration and subsequent diverse complications and need for emergent intervention.

FB ingestion in children is common and fortunately the majority of them pass through the gastrointestinal tract spontaneously. Immediate endoscopic retrieval is warranted in cases of sharp or pointed FBs. A dry run on a simulated FB with various available instruments simplify safe extraction of the FB. A surgical approach is justified in cases of failed endoscopic removal of sharp FBs to prevent intestinal perforation and other complications due to unpredictable migration of the FBs. However, even though endoscopic removal of FBs in children is safe with innovative technical artistry and accessories, the most effective management of FB accidents in children is still their prevention.

REFERENCES

1. van As AB, du Toit N, Wallis L, Stool D, Chen X, Rode H. The South African experience with ingestion injury in children. *Int J Pediatr Otorhinolaryngol* 2003;67 Suppl 1:S175-8.
2. Chung JH, Kim JS, Song YT. Small bowel complication caused by magnetic foreign body ingestion of children: two case reports. *J Pediatr Surg* 2003;38:1548-50.
3. Webb WA. Management of foreign bodies of the upper gastrointestinal tract: update. *Gastrointest Endosc* 1995;41:39-51.
4. Chang JJ, Yen CL. Endoscopic retrieval of multiple fragmented gastric bamboo chopsticks by using a flexible overtube. *World J Gastroenterol* 2004;10:769-70.
5. Seo JK. Endoscopic management of gastrointestinal foreign bodies in children. *Indian J Pediatr* 1999;66 (1 Suppl):S75-80.
6. Wyllie R. Foreign bodies and bezoars. In: Behrman RE, Kliegman RM, Arvin AM, editors. *Nelson Textbook of Pediatrics*. Philadelphia: WB Saunders, 1996:106-7.
7. Antao B, Foxall G, Guzik I, Vaughan R, Roberts JP. Foreign body ingestion causing gastric and diaphragmatic perforation in a child. *Pediatr Surg Int* 2005;21:326-8.
8. Cheung YC, Ng SH, Tan CF, Ng KK, Wan YL. Hepatic inflammatory mass secondary to toothpick perforation of the stomach: triphasic CT appearances. *Clin Imaging* 2000;24:93-5.
9. Li Voti G, Di Pace MR, Castagnetti M, De Grazia E, Cataliotti F. Needle perforation of the bowel in childhood. *J Pediatr Surg* 2004;39:231-2.
10. Sinha DD, Sharma C, Gupta V, Chaturvedi V. Sewing needle appendicitis in a child. *Indian J Gastroenterol* 2004;23:219-20.
11. Spitz L, Kimber C, Nguyen K, Yates R, de Leval M. Perforation of the heart by a swallowed open safety-pin in an infant. *J R Coll Surg Edinb* 1998;43:114-6.
12. Gun F, Salman T, Abbasoglu L, Celik R, Celik A. Safety-pin ingestion in children: a cultural fact. *Pediatr Surg Int* 2003;19:482-4.
13. Case TC. Appendiceal calculus with an open safety pin as a nucleus. *N Y State J Med* 1950;50:2311-2.
14. Salaman R, Foster M. Ingested foreign body presenting as an irreducible inguinal hernia in a baby. *J Pediatr Surg* 1993;28:262-3.
15. Cay A, Imamoglu M, Sarihan H, Sayil O. Duodenocolic fistula due to safety pin ingestion. *Turk J Pediatr* 2004;46:186-8.
16. Andreasson L, Ingelstedt S, Tjernstrom O. Peristaltic closure of a safety pin – an unusual fate of a safety pin seen as a foreign body in the gastrointestinal tract. *J Laryngol Otol* 1986;100:385-8.
17. Bullaboy CA, Derkac WM, Johnson DH, Jennings RB Jr. False aneurysm of the aorta secondary to an esophageal foreign body. *Ann Thorac Surg* 1985;39:275-6.