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Retained Foreign Body in the Alimentary Tract in Children

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Abstract

Background / Purpose : Foreign body ingestion is a common problem in pediatric emergency. The aim of this study was to review the clinical presentation and evaluation of the treatment of foreign body retention in the alimentary tract in children.

Methods : Medical records of the patients who were admitted to the Queen Sirikit National Institute of Child Health for foreign body ingestion during 1988 to 1998 were reviewed. Clinical presentation, radiological findings, modes and results of the treatment were studied.

Results : One hundred and forty-eight patients were assessed for foreign body retention in the alimentary tract; 93 were male and 55 were female. Age of the patients ranged from 7 months to 13 years. Eighty-nine cases (60.1%) were 3 years of age or younger, and 38 cases (25.7%) were between 3 to 6 years of age. Vomiting, dysphagia, salivation and coughing were the common symptoms found in 38.5, 18.2, 15.5 and 15.5 per cent of the cases respectively. One-third of the patients (35.8%) had absence of symptoms after foreign body ingestion. Blunt foreign bodies were proven in 125 cases (84.5%) and metallic coins were the most common objects in this group. Sharp foreign bodies were noted in 23 cases (15.5%), and straight pins, safety pins, chicken and fish bones were common. Radiological and endoscopic findings revealed the location of the foreign bodies at the hypopharynx, esophagus, stomach and intestine in 4, 127, 11 and 6 cases, respectively. The success rate of direct laryngoscopic and esophagoscopic removal of foreign bodies in the hypopharynx and the esophagus was 85.5 per cent (112 in 131 cases). The patients with foreign bodies in the stomach and the intestine were treated conservatively. Most foreign bodies could be passed spontaneously within 3 -15 days. Five patients (3.4%) underwent surgery for various indications, 1 for small bowel perforation and peritonitis 3 days after button battery ingestion, 2 for pin fixation at the duodenum over 3 days. In one case, a cervical esophagotomy was undertaken in order to remove a rubber toy which could not be removed during esophagoscopy because of vacuum effect. The remaining one patient underwent a thoracotomy and esophagotomy for removal of a curled wire in the mid position of the esophagus. There was no mortality among these 148 cases.

Conclusions : Prevention of foreign bodies ingestion should focus on toddlers to 6-year-old children. Vomiting, dysphagia, salivation and coughing were the common symptoms but absence of symptoms could not exclude retained foreign body in the gastrointestinal tract. Direct laryngoscopy and esophagoscopy under general anesthesia were the suitable procedure for removal of foreign bodies in the hypopharynx and the esophagus. Almost all of the patients with foreign bodies in the stomach and the intestine could be conservatively treated with exception in a few cases.

Foreign body ingestion remains a common problem in pediatric emergency especially in the preschool-age children. Most of the ingested materials that have passed from the esophagus into the stomach are excreted through the remaining gastrointestinal (GI) tract without causing any problems,[1] however surgical intervention is indicated in some cases.[2-5] Serious complications of ingested foreign bodies include sudden death due to aspiration,[6] esophageal and intestinal perforation,[7-9] esophagotracheal fistula[10] and esophagoaortic fistula.[5,11]

In order to assess our experience in the treatment of foreign body ingestion, we studied the patients with foreign body retention in the alimentary tract in our institute during the recent decade.

Materials and Methods

Medical records of the pediatric patients who were admitted to the Queen Sirikit National Institute of Child Health (Children's Hospital) for foreign body retention in the alimentary tract during January 1988 to December 1998, were reviewed. The diagnosis was confirmed by radiological or endoscopic findings of the foreign bodies in the alimentary tract. Information of the patients were collected. Clinical presentation, radiological findings, modes and results of the treatment were analyzed. The exclusion criteria for this study were the patients with conservative treatment of foreign body retention at the out-patient department and the patients with history of foreign body ingestion but they could not be proven by radiology or endoscopy.

Results

Age and sex incidence

One hundred and forty-eight patients were available for assessment of foreign body retention in the alimentary tract. Ninety-three were male and 55 were female. The ratio of male to female was 1.7:1. Age of the patients ranged from 7 months to 13 years. Eighty-nine cases (60.1%) were 3 years of age or younger and 38 cases (25.7%) were between 3 to 6 years of age (Table 1). The youngest in these 148 cases was a 7-month-old boy who had ingested a piece of rusty steel while playing on the floor. The oldest was a 13-year-old boy who accidentally ingested a 10-baht coin while swimming in a canal.

Table 1 Age incidence in the 148 patients.

Age	No. of the patients	Per cent
0-3 years	89	60.1
3-6 years	38	25.7
6-9 years	12	8.1
over 9 years	9	6.1
Total	**148**	**100.0**

Table 2 Clinical presentation after foreign body ingestion.

Symptomatology	No. of the patients	Per cent
vomiting	57	38.5
dysphagia	27	18.2
salivation (drooling)	23	15.5
coughing	23	15.5
choking	4	2.7
chest pain	4	2.7
absence of symptom	53	35.8

Clinical presentation

Only two-third of patients (95 cases or 64.2%) developed symptoms and signs after foreign body ingestion. Vomiting was noted in about 39 per cent of the cases. Dysphagia, salivation (drooling) and coughing were recorded in 18.2, 15.5 and 15.5 per cent respectively. The remaining 53 patients (35. 8%) had no symptoms (Table 2). About 87 per cent of the cases were brought to the hospital within 24 hours (Table 3). Two children had histories of foreign body ingestion for a long period of time. One 11-month-old girl with a history of ingestion of a curled wire for over one month was found to retain the foreign body in the mid portion of the esophagus on admission. One 3-year and 6-month-old boy with mental retardation had a history of marble ingestion 8 months previously.

Types of the foreign bodies

Most of the foreign bodies were blunt objects which were found in 125 cases (84.5%). Metallic coins were the most common in this group. Others were plastic and metallic toys, seed of sandorica, button battery and marbles.

Sharp objects were recorded in the remaining 23

Table 3 Time interval between foreign body ingestion and hospitalization.

Duration of onset	No. of the patients	Per cent
0-6 hours	110	74.3
6-12 hours	8	5.4
12-24 hours	12	8.1
1-7 days	13	8.8
over 7 days	2	1.4
unknown	3	2.0

Table 4 Various types of foreign bodies in the 148 patients.

Foreign bodies	No. of the patients
Blunt	125 (84.5%)
metallic coin	115
toy	4
metallic ring	2
seed of sandorica	1
marble	1
jeans button	1
button battery	1
Sharp	23 (15.5%)
straight pin	5
safety pin	4
sewing needle	1
chicken bone	3
fish bone	3
curled wire	2
metallic toy	2
rusty metal	2
toothpick	1

cases (15.5%). Straight pins, safety pins and animal bones were found in 5, 4 and 6 cases respectively. Other sharp foreign articles included sewing needle, toothpick, pieces of aluminium and rusty steel, curled wire and metallic toys (Table 4).

Sites of the foreign bodies and treatment

Locations of the foreign body retention were classified by radiological and endoscopic findings. One hundred and forty-five objects were found in various areas of the alimentary tract by chest and abdominal x-rays. In 3 cases, the foreign bodies were not revealed by roentgenogram but proven by esophagoscopy, one had a seed of sandorica and 2 had plastic toys impacted in the upper esophagus. The foreign articles were initially noted in the hypopharynx and the esophagus in 131 cases (88.5%), in the stomach in 11 cases (7.4%) and in the intestine in 6 cases (4.1%).

Endoscopy was performed under general anesthesia in the 129 patients with retained foreign bodies in the hypopharynx and the esophagus. Twenty-nine articles lodging in the hypopharynx and the upper esophagus (cricopharyngeal part) were retrieved by direct laryngoscopy (Figure 1). Rigid esophagoscopy was performed in 100 patients and successful retrieval was accomplished in 84 cases (84%). In the remaining 16 of the 100 patients, 12 foreign bodies were unintentionally dislodged from the esophagus into the stomach during esophagoscopy. In 2 cases, the attempt of retrieval during esophagoscopy was not successful and both required surgical removal. In the last 2 cases, the objects spontaneously passed from the upper esophagus into the stomach during admission.

Of the 33 patients, 17 objects initially seen in the stomach and the intestine and 18 items dislodged from the esophagus into the stomach, conservative management was elected (Figure 2). Thirty of the 35

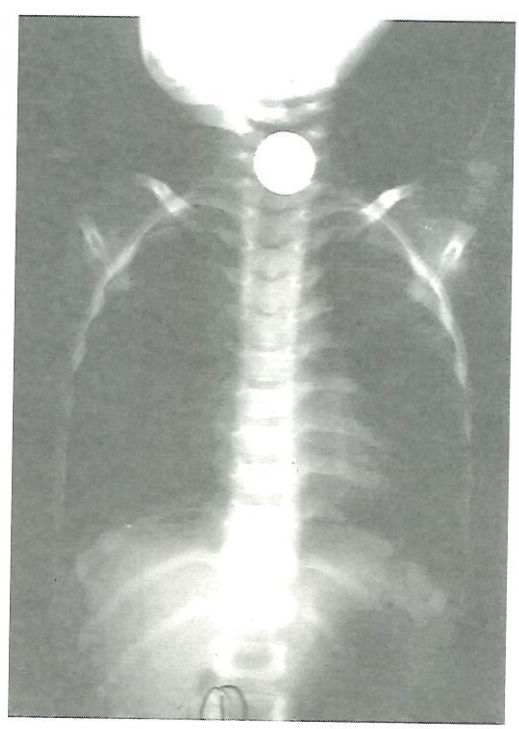


Fig. 1 A coin in the upper esophagus was detected by chest x-ray.

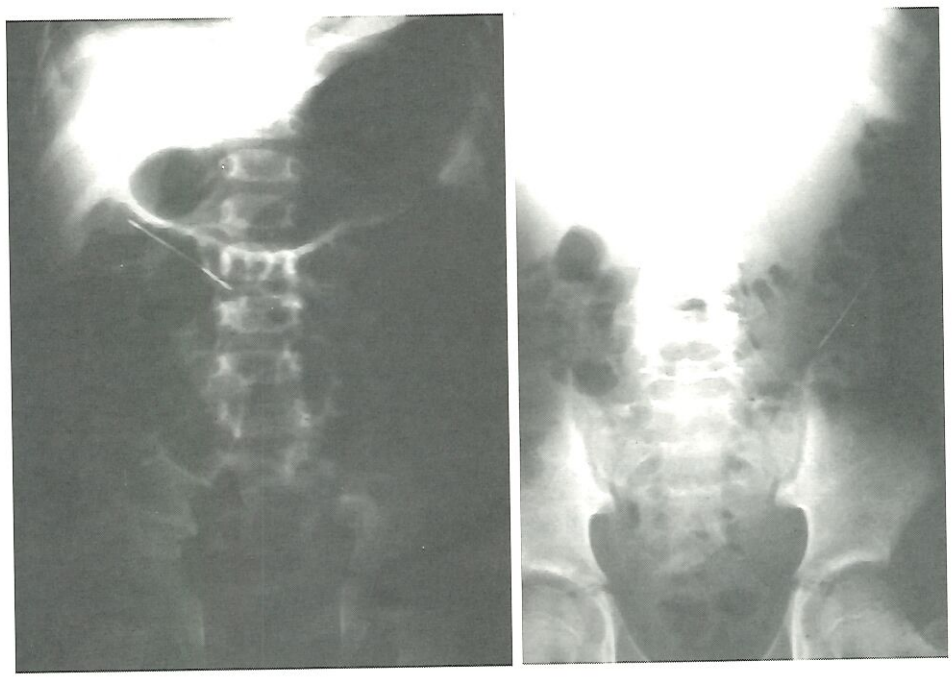


Fig. 2 Plain abdominal films show a straight pin lodged into the intestine.

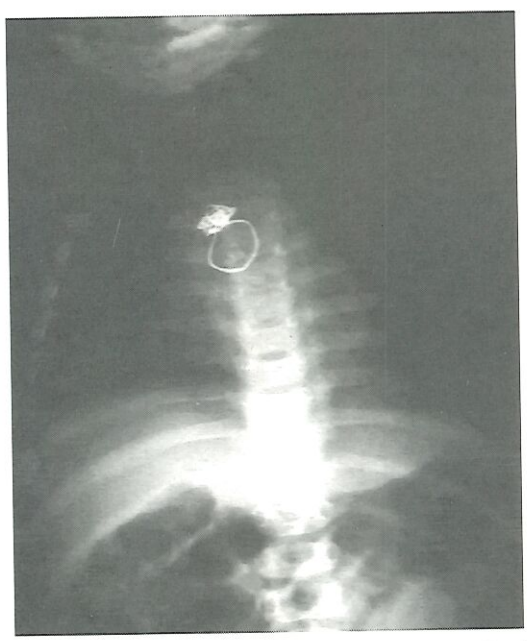


Fig. 3 Chest film showing a curled wire retention in the mid portion of the esophagus.

foreign bodies (91%) could be passed spontaneously within 3 - 15 days for the blunt objects and 3 - 7 days after the history of ingestion for the sharp objects. Three patients in this group were operated on. Correlation of sites of the foreign bodies and results of the treatment was summarized in Table 5.

From this study, surgical intervention was performed in 5 patients for various indications. One girl required an exploratory laparotomy and jejunal resection because of bowel perforation and peritonitis 3 days after button battery ingestion. Two boys underwent a laparotomy with duodenotomy and removal of foreign bodies due to pin impaction at the second part of the duodenum and the D-J junction for over 3 days. In the fourth patient, a cervical esophagotomy was undertaken in order to remove a rubber toy which could not be retrieved during esophagoscopy because of vacuum effect between the rubber toy and the esophageal mucosa. The last patient underwent a thoracotomy and esophagotomy for removal of a curled wire in the mid portion of the esophagus (Figure 3). She also required multiple esophageal dilatations for esophageal stricture.

There was no death among the 148 children with retained foreign bodies in the alimentary tract. Only 2 girls developed serious complications. Intestinal perforation and peritonitis occurred in one girl who ingested a button battery. An esophagotracheal fistula and esophageal stricture developed in a 11-month-old girl with a curled wire retention at the mid portion of the esophagus for more than one month. The average hospitalization in the patients with successful endoscopic removal of foreign bodies from the

Table 5 Correlation of various sites of the foreign body retention and results of treatment.

Location	No.	Laryngoscopic removal (successful)	Esophagoscopic removal		Conservative treatment	Operation
			successful	failed		
Blunt objects						
hypopharynx+ upper esophagus	99*	26	62	9	-	1
middle esophagus	6	-	5	1	-	-
lower esophagus	12	-	7	5	-	-
stomach	5	-	-	-	5	-
intestine	3	-	-	-	3	1
Sharp objects						
hypopharynx+ upper esophagus	13	3	10	-	-	-
middle esophagus	1	-	-	1	-	1
lower esophagus	0	-	-	-	-	-
stomach	6	-	-	-	6	1**
intestine	3	-	-	-	3	1

** In two cases, coins were revealed in the upper esophagus by chest x-rays from the other hospitals. After admission, these coins spontaneously passed into the stomach and they were shown in the roentgenogram at our institution.*

*** A pin was initially seen in the stomach. It passed into the duodenum and constantly fixed there for over 3 days.*

esophagus was about 24 hours while the patients with conservative treatment of foreign body in the stomach and the intestine were observed in the hospital for about 3 days.

Discussion

Children are one of the most frequent victims of foreign body ingestion. The most important causative factors are parental carelessness in leaving small objects within reach of children and parental bad habits of placing small objects such as toothpicks, pins and coins in their mouths. Small children under 6 years of age are prone to foreign body ingestion and retention in the GI tract.[9,11,12] For this reason, prevention of foreign body ingestion should focus on todlers to 6-year-old children.

Metallic coin is the most common foreign body ingestion in many series,[9,11-15] similar to our findings. The most likely positions of the coins at the time of admission were the cricopharyngeal area of the esophagus and the stomach and there was no significant correlation between coin location and age of the patients.[9] The symptoms were more common in the cases with coins impaction in the upper and middle esophagus. Regarding the lodging locations of the sharp objects, fish bones were commonly fixed at the hypopharynx, chicken bones arrested at the upper esophagus while pins, safety pins and needles commonly passed into the stomach and the intestine.

The diagnosis of retained articles was obtained by history of foreign body ingestion including classical clinical presentations and confirmation by chest and abdominal x-rays. Absence of symptoms did not exclude retained foreign bodies in the alimentary tract.

The esophagus is the narrowest organ of the alimentary tract that compares with the stomach and the intestine. It is a rather passive and non-adaptable organ, of which the peristaltic contractions are relatively weak. In addition, anatomic narrowings make this organ more prone to impaction of foreign bodies than other areas of the alimentary tract.[16] The anatomic narrowings are in the cricopharyngeal area, area of the aortic arch, the left main bronchus and the region of the diaphragmatic hiatus.[17] In our patients, the foreign articles lodged in the hypopharynx to the esophagogastric junction in about 90 per cent of the cases (Table 5). The initial symptoms often begin with

vomiting, choking, coughing, dysphasia and drooling. Sometimes the children feel substernal or chest pain when the foreign bodies arrest at the middle or lower esophagus. The symptoms disappear after the foreign bodies passed into the stomach. Prolonged foreign body impaction may cause ulceration, esophageal perforation and may be complicated with esophagobronchial or esophagotracheal fistula, mediastimitis, fatal aortoesophageal fistula and abscess formation.[5,7-11] One case in this study developed esophagotracheal fistula and esophageal stricture because of retention of a curled wire in the mid portion of the esophagus for over one month. The treatment of these complications was more difficult, more complex, expensive and taking a long period of time. For this reason, early detection and early removal of foreign bodies should be performed.

Esophagoscopy remains the treatment of choice for foreign bodies in the esophagus.[11,13,15,18] The only disadvantage of esophagoscopy is the necessity to be done under general anesthesia in the children. Extraction by Foley or balloon catheter is an alternative method for removal of retained blunt objects especially metallic coins in the upper esophagus. This technique was initially reported in 1966[19] and its success was advocated in many series.[20-22] However, Manning et al[23] reported less successful experience with this technique. They noted that the duration of foreign body impaction adversely affected the success of this method. If the impaction duration was greater than 24 hours, the extraction may not be successful. In the recent decade, some investigaters[24,25] advocated the efficacy of esophageal bougienage for dislodging of coins in the esophagus into the stomach. This technique involved a single pass of a Hurst bougie dilator from the mouth to the stomach with the unsedated patient sitting upright. It could be managed by physicians in the emergency room. Both Foley catheter and bougienage technique were claimed to be safe, effective with lower cost.[24-31] Emslander et al[24] and Kelly et al[27] set the criteria for bougienage and Foley catheter extraction to include : (1) duration less than 24 hours; (2) no respiratory distress; and (3) no history of esophageal disease or surgery. However, Macpherson et al[11] emphasized that the Foley catheter method of foreign body extraction could be used on some patients, but esophagoscopy remained the safest method of esophageal foreign body extraction in all cases. In this study, we used only rigid esophagoscopy for esophageal foreign body removal in 100 cases and the success rate was 84 per cent without any complications (Table 5).

Most foreign bodies in the stomach could pass through the distal GI tract without any problems. Suita et al[12] concluded that foreign articles in the stomach could be managed conservatively in the vast majority but having the exception in a few cases with impaction of button batteries, needles or sharp edged objects which might penetrate or perforate the gut and foreign body retention in the case of previous surgery of gastric outlet obstruction. During waiting for expelling of the foreign objects, patients could have normal intake of oral diet.

Button battery ingestion is an increasing problem. The review of Litovitz and Schmitz[32] for clinical experience of 2,382 cases with button battery ingestion revealed that burns caused by esophageal lodgment occurring 4 hours after ingestion and perforation occurring in another 2 hours later. Patients with batteries lodged in the esophagus have greater serious complication than patients who have batteries that passed into the distal GI tract.[32,33] This is probably due to the fact that batteries that are impacted in the esophagus have less dilution by esophageal secretion than the GI secretion in more distal segments. Many serious complications after button battery ingestion were reported in the literature.[3,8,10,32-34] Button battery impaction in the esophagus could be managed by esophagoscopic and Foley catheter removal. Orogastic magnet tube was also used to retrieve button batteries in the esophagus and stomach. Mc Dermott et al[35] reported the success in the removal by this technique in 2 cases with button batteries lodging in the small intestine. In general, patients with button batteries in the intestine require close observation because they can spontaneously pass through the GI tract without any problems in most cases. Surgical intervention should be done in the patients who develop abdominal signs and symptoms of peritonitis or intestinal perforation.

Conclusion

This study emphasized only the 148 children who were admitted for management of foreign bodies in the alimentary tract. Most of them were under 6 years old. The clinical presentation after foreign body

ingestion included vomiting, dysphasia, salivation and coughing. Absence of symptoms did not exclude the presence of foreign bodies in the alimentary tract. In our opinion, direct laryngoscopy and esophagoscopy were suitable for removal of foreign body retention in the hypopharynx and the esophagus in all types of the foreign bodies. For the patients with foreign bodies in the stomach and the intestine, conservative management was strongly recommended. Surgical intervention may be required in the cases of sharp objects with fixation at the same site without a change of position over 3 days, with signs and symptoms of peritonitis, bowel perforation, GI hemorrhage and intestinal obstruction.

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