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ORIGINAL ARTICLE

Esophageal foreign bodies in children: Emphasis on complicated cases

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KEYWORDS

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Summary *Background:* Esophageal foreign bodies (EFBs) are a relatively common clinical problem in pediatric patients. The majority of EFBs pass harmlessly through the gastrointestinal tract; however, some EFBs can cause significant morbidities. This study was conducted to review our experience in managing esophageal foreign bodies in pediatric patients, with an emphasis on the management and outcomes of complicated cases.

Methods: Between March 1995 and March 2013, the records of all children up to the age of 12 years who were admitted to King Khalid University Hospital, Riyadh, Saudi Arabia, with a final diagnosis of EFBs were reviewed. The medical records were analyzed with respect to demographic data, presenting symptoms, workup investigation, management, complications, and outcomes.

Results: Seventy patients were identified (38 boys and 32 girls). The ages ranged from 5 days to 12 years (mean: 4.4 years). Fifty-three (75.7%) patients presented within 24 hours. Thirteen (18.6%) patients had underlying predisposing factors. The most common EFB, found in 30 (42.8%) patients, was a coin. Witnessed ingestion of a FB was documented in 52 (74.2%) patients. The most common symptoms were drooling of saliva in 42 (60%) patients, followed by vomiting in 36 (51.4%) patients. Four (5.7%) patients presented with complications secondary to FB impaction, including hypopharyngeal wall perforation, acquired esophageobronchial fistula, localized esophageal perforation with inflammation, and perforation with stricture formation. The follow-up period ranged from 2 to 12 months, and all patients had complete recovery without any sequelae.

Conflicts of interest: All authors declare no conflicts of interest.

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Conclusion: EFBs are a relatively common problem in pediatric patients, and underlying predisposing factors to EFB impaction are not uncommon. Long-retained EFBs are associated with a higher incidence of complications. Rigid esophagoscopy was successful in extracting most of the EFBs and was shown to be a safe and effective procedure.

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1. Introduction

Foreign body (FB) ingestion is a common problem with more than 100,000 cases reported each year in the United States, and 80% of the reported cases occurring in children.¹ Establishing the diagnosis in children is difficult, especially if ingestion of the FB was not witnessed.² Various types of ingested FBs have been reported, with the FB types varying according to the country, culture, and medical specialty reporting the ingestion. Rigid esophagoscopy has long been recommended as the procedure of choice to remove the FB. Other modalities for the management of ingested FBs include flexible esophagoscopy, esophageal bougienage, and balloon extraction under fluoroscopic guidance.³ This study was conducted to review our experience in managing esophageal FBs in pediatric patients, with more emphasis on complicated cases. This study examined FB characteristics, management, and outcomes.

2. Methods

This was a retrospective review of all children (up to the age of 12 years) who were admitted to King Khalid University Hospital, Riyadh, Saudi Arabia, between March 1995 and March 2013, with a final diagnosis of esophageal FB ingestion. The data collected included the demographics, presenting symptoms, investigations, management, complications, and outcomes.

Rigid esophagoscopy (Karl Storz, Germany) was performed in the operating room under general anesthesia with endotracheal intubation. When identified, the FB was removed using grasping forceps, and the esophagoscope was then reinserted to check for retained FB and evaluate the esophagus.

3. Results

A total of 70 pediatric patients were admitted with a diagnosis of esophageal FB. The ages ranged from 5 days to 12 years, and 36 (51%) patients were <4 years of age. There were 38 boys and 32 girls, and the duration of FB ingestion prior to admission ranged from 30 minutes to 6 months. Fifty-three (75.7%) patients presented within 24 hours of ingestion. There was a history of witnessed FB ingestion in 52 patients (74%).

The most common symptoms were drooling of saliva in 30 (60%) patients, followed by vomiting in 36 (51%) patients. Six patients were asymptomatic, but presented with witnessed FB ingestion (Table 1).

Thirteen (18.6%) patients had an underlying predisposing factor, including six patients post-Nissen fundoplication for gastroesophageal reflux disease, five patients post-esophageal atresia repair, and two patients with esophageal peptic stricture secondary to gastroesophageal reflux. The FBs removed were food bolus in 10 patients, metallic objects in two patients, and a coin in one patient. All of these patients presented within 24 hours, with drooling of saliva and dysphagia.

Chest radiographs were performed in 65 (92.8%) patients, and FBs were detected in 49 of these patients. When a FB was highly suspected and not seen on a plain chest radiograph, additional imaging studies were performed. These studies included neck radiographs, abdominal radiographs, contrast swallows, or chest computerized tomography (Figure 1). The FBs were located in the esophagus in 63 patients, in the hypopharynx in six patients, and was not found in the one patient who ingested a FB based on the history by the mother, the FB passed spontaneously and was found in the diaper.

Variable types of FBs were removed. The most common FBs were coins [30 (42.8%)]. Other types were metallic objects (earrings and safety pins), food boluses, fish bones, disc batteries, plastic materials, and glasses (Table 2).

The hospital length of stay ranged from 1 to 11 days, with exceptions of the complicated cases. Fifty-three (75.7%) patients had 1 day of admission, and the follow-up periods ranged from 2 to 12 months. All patients had a complete recovery without complications or sequelae.

Four patients (5.6%) presented with complications secondary to FB ingestion. The first patient was a 6-month-old boy who ingested a sharp pointed earring that caused a limited hole at the hypopharyngeal wall. The FB was removed using Magill forceps, and the patient was kept *nil per os* and covered with antibiotics for 10 days. The perforation healed spontaneously, and he was followed for

Table 1 Presenting symptoms of EFB ingestion.

Symptoms	No. of patients	%
Drooling of saliva	42	60
Vomiting	36	51
Respiratory symptoms	31	44
Dysphagia	23	33
Odonophagia	6	9
Asymptomatic	6	9
Weight loss	1	1.4

EFB = esophageal foreign body.

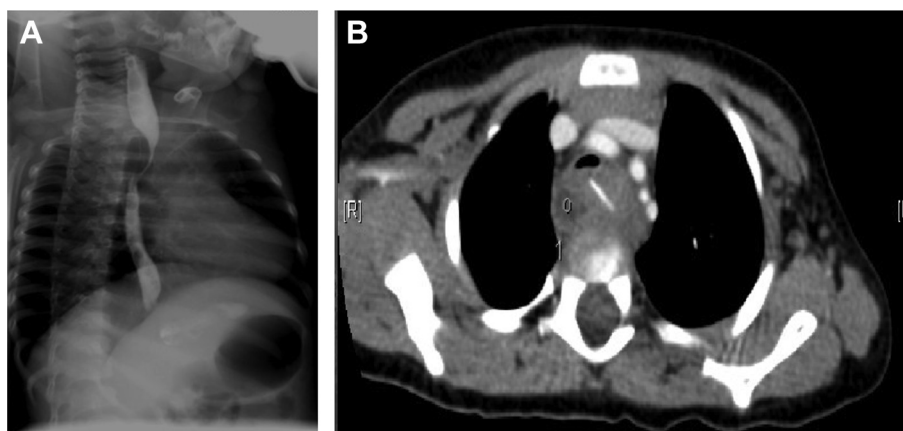


Figure 1 (A) Upper GI contrast swallow study demonstrating smooth narrowing with anterior displacement of a short segment of the upper thoracic esophagus; and (B) CT scan cut immediately above the carina shows prevertebral soft-tissue swelling and a linear high-density object within the swelling. The trachea is displaced anteriorly. CT = computed tomography; GI = gastrointestinal.

6 months with no issues. The second patient was a 20-month-old girl who ingested a disc battery and presented after 2 weeks. She developed an acquired left esophageo-bronchial fistula, and underwent rigid esophagoscopy and bronchoscopy and removal of the battery. Conservative management included inserting a nasogastric tube, total parenteral nutrition, and antibiotics for 4 weeks. A contrast study and repeated bronchoscopy revealed healing of the fistula, and the patient did not require any surgical intervention. She was followed for 1 year and did not have any swallowing issues. The third patient was an 8-month-old boy who presented with a 25-day history of dysphagia. Radiological images revealed an inflammatory mass at the posterior wall of the thoracic esophagus. Esophagoscopy showed a stricture, but no intraluminal masses or FBs. The patient underwent a right thoracotomy, and the inflammatory mass was opened and a clothes clip was found inside the mass and removed. Esophageal dilatation was performed, and a nasogastric tube was passed. Conservative management was continued for 2 weeks, and a contrast study showed no leak or stricture. He was followed for 1 year without any gastrointestinal complaints. The fourth

patient was an 18-month-old boy who presented with a 6-month history of dysphagia with no witnessed history of FB ingestion. Imaging studies, a contrast swallow, and a chest computed tomography (CT) scan revealed a linear density posterior to the upper thoracic esophagus with esophageal lumen narrowing (Figure 1). The child underwent a thoracoscopic exploration that revealed an inflammatory mass containing a FB that perforated the esophageal wall. He was followed for 1 year and required two dilations. These four children had uneventful recoveries with no short- or long-term sequelae.

4. Discussion

FB ingestion is a common problem in children.¹ All children ingest FBs, regardless of their age; however, FB ingestion is more common in younger patients.¹ As children explore and interact with the world, they inevitably place FBs into their mouths and swallow the objects, with most swallowed FBs passing harmlessly through the gastrointestinal tract.⁴ The age distribution reported in various studies showed similar results, with the majority of patients <4 years of age.^{1,3,4} In our study, we had 51% of patients <4 years of age. A witnessed history of FB ingestion is extremely important for reaching a quick, definite diagnosis.⁵ Louie et al⁵ published a study of 255 pediatric patients, with the majority of their patients having a witnessed history of FB ingestion. In our study, a witnessed history of FB ingestion was found in 74.2% of the cases.

The superior esophagus is the narrowest portion of the pediatric alimentary tract and is, therefore, the most common site for lodged FBs.³ Consistent with previous studies, the majority of FBs in our study were located in the esophagus, and mainly in the upper esophagus.^{3,6} In our study, 83% of patients had lodged FBs in the upper esophagus.

Worldwide, patients present with a wide variety of signs and symptoms depending on the age of the child, nature of the object, anatomical site involved, and the length of time since ingestion.⁵ Vomiting, dysphagia, drooling of saliva,

Table 2 Types of foreign bodies ingested.

Type of FB	No.	%
Coin	30	42.8
Metals	14	20
Food boluses	10	14.3
Fish bones	6	8.6
Disc battery	3	4.3
Plastic materials	2	2.9
Pieces of marbles	2	2.9
Pieces of glass	1	1.4
No. FB found	1	1.4
	1	1.4
Total	70	100

FB = foreign body.

and respiratory symptoms were the most common presenting symptoms in several studies.^{3,4,7} In our population, drooling of the saliva was the most common presenting symptom, followed by vomiting.

The types of ingested FBs differ among countries according to feeding habits, cultural features, and sociocultural properties.^{8–10} Several studies found that coins were the most frequently encountered FB ingestion in different populations.^{3,8} We reported that coins were the most common type of FB, followed by a wide variety of other FBs. In other regions, such as eastern populations, fish bones were the most common types of FB ingestion.^{3–10} Food bolus as a FB was seen more in patients with a pre-existing esophageal abnormality.⁶ Esophageal FB impaction is frequently associated with preexisting esophageal diseases, such as atresia, stricture, or dysmotility.^{4,6,11} Pre-existing esophageal conditions were found in 13 patients in our study and food bolus as a FB was encountered in 10 (76.9%) of these patients.

As stated by Lin et al¹¹ the diagnosis of a FB is based on three important elements: eye-witness accounts, X-ray, and endoscopic findings. Several studies documented the valuable use of a radiological workup in the diagnosis of FB ingestion.^{2,8,10,12} Although negative radiology findings could not exclude FB ingestion, imaging studies should be performed for any child who is suspected of ingesting a FB. Chest/abdominal X-rays are the most common radiological method used.^{2,8} Another review by Luk et al¹² showed that CT scans had a specificity of 96% and a high negative predictive value when endoscopy was negative in the diagnosis of FB ingestion. CT scans are useful if endoscopy is negative and the patient still has persistent symptoms associated with FB ingestion.¹² In our study, several methods of diagnostic radiology were used according to patient presentation and the type of FB. In general, X-ray was the initial study, and other imaging studies were used in several cases.

Many methods have been described in the literature for the removal of FBs, such as balloon extraction, advancement of a bougie, and flexible and rigid scopes. The choice of method depends upon the instruments available and on surgeon preference.⁸ We prefer rigid esophagoscopy to remove FBs, and this method was successful in 86% of cases.

FBs that damage the gastrointestinal tract, become lodged, or have associated toxicity must be identified and removed.¹³ A review by Waltzman et al¹³ reported that 25% to 30% of esophageal coins in children would pass spontaneously without complications. The treatment of these patients might reasonably include a period of observation, in the range of 8 to 16 hours, particularly among older children and children with distally located coins. Lin et al¹¹ and Kamath et al¹⁴ noted that ingested FBs should be removed as soon as possible, with delays in the diagnosis and management possibly leading to life threatening complications. Similarly, we recommend the removal of FBs as soon as possible without delay.

Complications related to FB ingestion are uncommon, but the associated morbidity might be severe and life threatening.⁷ Long-retained FBs have a higher incidence of complications, which include esophageal perforation, secondary collections, neck abscess, mediastinitis, peritonitis, and fistula formation.¹⁴ Life-threatening fistula formation might occur between the esophagus and the innominate

artery, causing severe bleeding.¹⁵ Saki et al⁴ published a review of 240 pediatric patients with esophageal FBs, with 10% having complications secondary to esophageal FBs, mainly esophageal perforation, and none of the complications associated with long-term morbidity. Another study by Gregori et al¹⁵ noted that 14 patients had complications. The type and characteristics of the ingested FB play an independent role in the outcome.¹⁵ Inorganic FBs are less associated with complications as compared with organic FBs.¹⁵ The most common FBs that caused complications were food (29%), coins (29%), and batteries (14%).¹⁵ In comparison to previous studies, we had four (5.7%) patients who developed complications secondary to FB ingestion. The complications were esophageal perforation, inflammatory reaction, fistula formation, and esophageal stricture. No long-term complications occurred. Fever, pain, tenderness, and subcutaneous or mediastinal emphysema are alarming symptoms and are signs of esophageal perforation secondary to FB ingestion.¹⁵ Timely diagnosis and management are mandatory to prevent these complications.¹⁵

Esophageal FBs are a relatively common problem in pediatric patients, and underlying predisposing factors to esophageal FB impaction are not uncommon. Long-retained esophageal FBs are associated with a higher incidence of complications. Rigid esophagoscopy was successful in extracting most of the esophageal FBs and proved to be a safe and effective procedure.

References

1. Wyllie R. Foreign bodies in the gastrointestinal tract. *Curr Opin Pediatr.* 2006;18:563–564.
2. Shinhar SY, Strabbing RJ, Madgy DN. Esophagoscopy for removal of foreign bodies in the pediatric population. *Int J Pediatr Otorhinolaryngol.* 2003;67:977–979.
3. Little DC, Shah SR, St Peter SD, et al. Esophageal foreign bodies in the pediatric population: our first 500 cases. *J Pediatr Surg.* 2006;41:914–918.
4. Saki N, Nikakhlagh S, Safai F, Peyvaste M. Esophageal foreign bodies in children. *Pak J Med Sci.* 2007;23:854–856.
5. Louie JP, Alpern ER, Windreich RM. Witnessed and unwitnessed esophageal foreign bodies in children. *Pediatr Emerg Care.* 2005;21:582–585.
6. Zhang S, Cui Y, Gong X, Gu F, Chen M, Zhong B. Endoscopic management of foreign bodies in the upper gastrointestinal tract in South China: a retrospective study of 561 cases. *Dig Dis Sci.* 2010;55:1305–1312.
7. 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.
8. Orji FT, Akpeh JO, Okolugbo NE. Management of esophageal foreign bodies: experience in a developing country. *World J Surg.* 2012;36:1083–1088.
9. Higo R, Matsumoto Y, Ichimura K, Kaga K. Foreign bodies in the aerodigestive tract in pediatric patients. *Auris Nasus Larynx.* 2003;30:397–401.
10. Wai Pak M, Chung Lee W, Kwok Fung H, van Hasselt CA. A prospective study of foreign-body ingestion in 311 children. *Int J Pediatr Otorhinolaryngol.* 2001;58:37–45.
11. Lin CH, Chen AC, Tsai JD, Wei SH, Hsueh KC, Lin WC. Endoscopic removal of foreign bodies in children. *Kaohsiung J Med Sci.* 2007;23:447–452.

12. Luk WH, Fan WC, Chan RY, Chan SW, Tse KH, Chan JC. Foreign body ingestion: comparison of diagnostic accuracy of computed tomography versus endoscopy. *J Laryngol Otol.* 2009;123:535–540.
13. Waltzman ML, Baskin M, Wypij D, Mooney D, Jones D, Fleisher G. A randomized clinical trial of the management of esophageal coins in children. *Pediatrics.* 2005;116: 614–619.
14. Kamath P, Bhojwani KM, Prasannaraj T, Abhijith K. Foreign bodies in the aerodigestive tract – a clinical study of cases in the coastal belt of South India. *Am J Otolaryngol.* 2006;27: 373–377.
15. Gregori D, Scarinzi C, Morra B, et al. Ingested foreign bodies causing complications and requiring hospitalization in European children: results from ESFBI study. *Pediatr Int.* 2010;52: 26–32.