

## Comparative Study of Swallowed Foreign Body Extraction between Oesophagoscope and Conservative Management

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### ABSTRACT

**Background:** Bolus impaction of food or other foreign bodies is common. Most foreign bodies that are accidentally swallowed will be expelled without medical intervention. Evidence from pre-endoscopic series suggests that eighty percent or more of foreign bodies will pass naturally. **Aim of the study:** The aim of this study was to compare between the outcome of management of foreign body in esophagus by oesophagoscopy and by conservative management. **Patients and Methods:** This was prospective research involving 40 patients with foreign body ingestion. In Cardiothoracic Unit at Al-Azhar University, Assiut Hospital and Cardiothoracic Department Assiut University Hospital, 20 patients underwent extract foreign body by oesophagoscope and 20 patients underwent conservative management. **Results:** highly statistically significant (p-value < 0.001) increased percentage of infection in conservative group (15 patients, 75%) when compared with endoscopic group (1 patient, 5%). No statistically significant (p-value > 0.05) difference between endoscopic and conservative treatment as regard laceration of mucosa, esophageal perforation, retropharyngeal abscess, esophageal obstruction, esophageal necrosis, esophageal stricture and tracheoesophageal fistula. **Conclusion:** Children under the age of three are disproportionately affected by the common occurrence of foreign body (FB) ingestion. Eighty to ninety percent of gastrointestinal (GI) FBs are expelled normally without intervention (i.e., without problems), ten to twenty percent are removed endoscopically, and one percent necessitate open surgery. Thus, FB swallowing is a major clinical challenge for pediatric gastroenterologists. **Keywords:** Foreign bodies, Endoscopy, Gastrointestinal emergency, Medical management, Dysphagia.

### INTRODUCTION

Foreign body swallowing and aspiration are common occurrences in children. Although airway aspiration is generally considered more dangerous, delayed diagnosis of esophageal foreign bodies leads to complications that are also life-threatening. Children with esophageal foreign bodies routinely present to their primary care physicians or emergency department staff with a variety of symptoms of the respiratory and/or gastrointestinal systems consistent with multiple disease processes <sup>(1)</sup>.

Although swallowing of a foreign body (FB) is prevalent among children, esophageal FB impaction is common in adults. Among children, the type of FB varies according to the feeding habits and sociocultural features of the community. By far the most reported esophageal FB (EFB) in children is the coin, whereas in adult's fish bones rank among the most common impacted EFBs <sup>(2)</sup>.

Although many EFBs are retrieved without event, FBs can lead to devastating complications such as esophageal perforation, tracheoesophageal fistula, respiratory distress, and even death <sup>(3)</sup>.

Otolaryngologists, gastroenterologists, pediatric surgeons, cardiothoracic surgeons, and pediatric pulmonologists are the specialists who deal with foreign bodies that get stuck in the aerodigestive system. Depending on the patient's age, the severity of their condition, the nature of the foreign body, and whether or not it was aspirated, there are a variety of possible treatments <sup>(4)</sup>.

In most cases, the operation doesn't need to be performed immediately but should be completed within

a few hours when the right instruments and personnel have been assembled. This permits a thorough evaluation of the airway with ample preparation for the best possible instrumentation and planning for alternate techniques, such as the ability to do an emergency surgical airway if necessary <sup>(5)</sup>.

Managing EFBs might be difficult because of a lack of trained medical professionals and adequate esophagoscopy resources in some poor nations. One study also attempted to determine what characteristics are linked to a negative esophagoscopy and what radiologic signals are useful in locating EFBs <sup>(6)</sup>.

Most of foreign body swallowed can be passed to GIT (gastrointestinal tract) without complication (conservative management). In some patient cases, foreign bodies passed spontaneously. It means, hospital stay was 2-8 days. Some patients were hospitalized for 16 additional days for psychiatric treatment. The foreign bodies passed through the GI tract and were absent on subsequent radiographic examination, though seldom recovered <sup>(7)</sup>.

The purpose of this research was to assess the effectiveness between the outcome of management of foreign body in esophagus by oesophagoscopy and by conservative management.

### PATIENTS AND METHODS

This was a prospective study that included 40 patients suffering from foreign body ingestion in Cardiothoracic Unit at Al-Azhar University, Assiut Hospital and Cardiothoracic Department, Assiut University Hospital, 20 patients underwent extract foreign body by

oesophagoscope and 20 patients underwent conservative management.

Detailed history taking was done to record information regarding patient history (name-age-sex-complain-time of ingestion-present history-past history), physical examination, laboratory parameters (complete blood counts (CBC), erythrocyte sedimentation rate (ESR), C reactive protein (CRP), total leucocyte count (TLC)), ultrasonography findings and X-ray.

**Inclusion criteria:** All ages were included in this study and history of foreign body ingestion

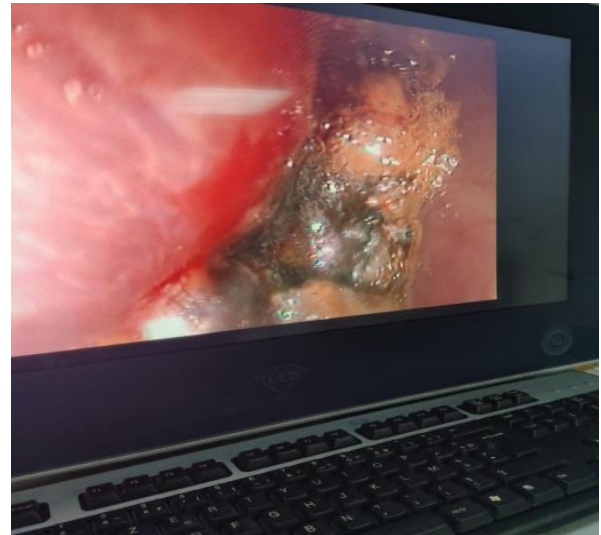
**Exclusion criteria:** Having any of the following conditions meant that a patient was not included in the study: Respiratory Distress patient and ingestion of sharp object.

**In cases with coin ingestion (we ensure by history and posteroanterior (PA) and lateral view films), which might present in: Oesophagus (Figure 1):** the presence of symptoms (such as drooling, dysphagia, or respiratory impairment) that necessitates immediate endoscopic removal. If the patient was asymptomatic, endoscopic excision of the distal oesophageal coin was recommended within 24 hours. **Gastric:** There was no requirement for endoscopic examination. It was thought about using a stool strainer, laxatives, and getting another X-ray in two weeks. If the X-ray was positive after two to four weeks, the coin was removed endoscopically. Close observation in a hospital setting (endoscopy/surgical removal if symptoms persist).



**Fig (1):** Swallowed coin extraction by oesophagoscope

**In cases with button battery ingestion (we ensured by history and PA and lateral view films) it may present in: Oesophagus (Figure 2):** For patients in a stable condition, urgent endoscopic removal was recommended. Endoscopic removal in the operating room (OR) with surgery/cardiovascular surgery present for active bleeding or clinical instability. Esophageal injuries warrant hospitalisation with non-oral nutrition and hydration and intravenous antibiotics.



**Fig (2):** button battery extraction by oesophagoscope.

We also considered a chest MRI to ascertain how close the injury is to the aorta and angiography to rule out aortic injury. Prior to progressing with diet as tolerated, an esophagram was performed to rule out leak if there was no major harm to surrounding tissue or the aorta was not nearby. If an injury was demonstrated near the aorta, the patient was treated with nothing by mouth (NPO) and antibiotics while undergoing serial magnetic resonance images (MRIs) every 5-7 days until the injury recedes from the aorta. If hematemesis or Upper Gastrointestinal Bleeding (UGI) bleeding developed within 21 days of removal, the patient was evaluated for an aortoenteric fistula and thoracotomy and CV surgery was prepared immediately.

**Gastric or beyond (Figures 3 and 4):** In patient less than 5 years of age and button battery equal or more than 20 mm: Endoscopic excision of any damaged tissue from the oesophagus was considered if it could be done within 24 to 48 hours; if this was not possible, the patient was admitted with NPO but with intravenous antibiotics and maybe CT, angiography or magnetic resonance imaging of the chest. If the patient was above 5 years old and/or the button battery was smaller than 20 mm, outpatient observation only might be an option. If the button battery fails to pass in the stool after 48 hours, a repeated X-ray was taken 10-14 days later for patients with larger batteries.

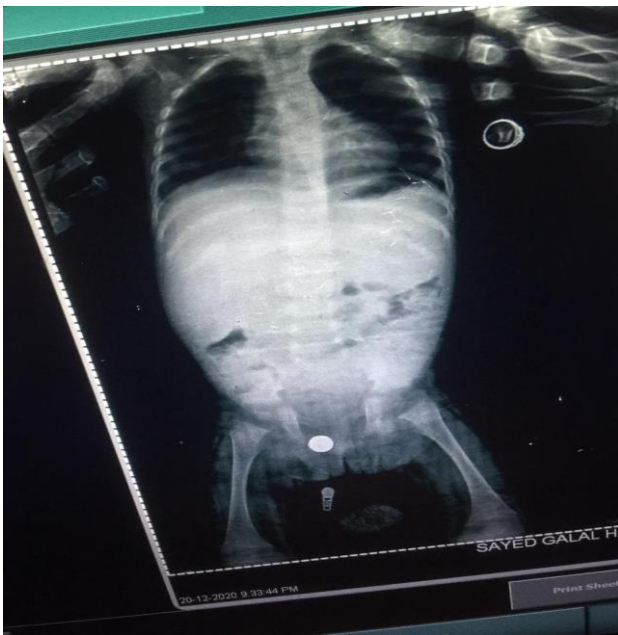


Fig (3): swallowed coin present in rectum



Fig (4): swallowed coin present in small intestine

And if GI symptoms appeared or it hadn't passed the stomach by the X-ray time mentioned above, endoscopic removal was necessary.

**In cases with esophageal food impaction, it might present in:**

**Oesophagus: Water-soluble contrast from the FB series** could be used to spot blockages. Or tolerating secretion: Endoscopic removal within 24 hours. Or not tolerating secretion: Urgent endoscopic removal.

**Proximal and distal esophageal biopsies were obtained and assessed for stricture and gastrointestinal follow up:**

If stricture without eosinophilic inflammation: Another endoscopy was done, this time with dilatation. Endoscopy was repeated after 4-8 weeks of proton pump inhibitor therapy and/or eosinophilic esophagitis treatment was recommended if eosinophilic inflammation with stricture was present. If eosinophilic inflammation without stricture: Repeated endoscopy was considered after 4-8 weeks of proton pump inhibitor therapy. If no eosinophilic inflammation and no stricture, clinical status was followed and proton pump inhibitor was considered if nonspecific inflammation was present.

In cases of magnet ingestion (we made sure by getting a history of known magnet ingestion and unexplained gastrointestinal symptoms with rare earth magnets in the environment, getting an abdominal X-ray if the magnets were on a flat plate, and getting a lateral X-ray), we distinguished between cases of single and multiple magnet ingestion:

**Single magnet:** if it existed in the abdomen or oesophagus: Option one: Pediatric gastroenterologist was consulted, if available, and removal was considered if the danger of subsequent ingestion was elevated. Option two would involve outpatient serial X-rays and parental education.

**Beyond the stomach:** Outpatient serial X-ray monitoring, parent education, and consultation with a pediatric gastroenterologist to confirm passage are all recommended next steps. A laxative, such as polyethylene glycol 3350, could be used if bowel movements had stalled.

**Multiple magnet:** - (or single magnet and metallic object): -It may present: **All within the stomach and esophagus:** Removal was performed, especially if less than 12 hours and if pediatric gastrointestinal was available. If necessary, a referral service was contacted.

**Beyond the stomach:** If available, a pediatric gastroenterologist and paediatric surgeon were consulted. Transfer to a referral centre was done if not available.

**Parenteral are educated to:** eliminating any adjacent magnets, avoiding clothing with metallic buttons or buckles, and ensuring that no other metal objects or magnets are accessible to the youngster for unintentional ingestion.

**METHODS**

**Group A:**

Twenty patients had an oesophagoscope procedure was done, with subsequent X-ray and CBC monitoring. Subsequent to this, the oesophagoscope was inflexible and the patient was subjected to it. The "sniffing posture" was done, in which the patient lies supine with his or her shoulders rolled forward, mimics the position required for endotracheal intubation. Using a mouth guard could help protect teeth from potential harm. The largest available rigid endoscope was chosen. The scope was inserted into the mouth with the bevel facing upward. Non-dominant hand's thumb and index finger were used as a fulcrum to hold it up.

The scope was moved posteriorly along the pharyngeal wall while seeing the area directly. Scope was tipped up, cricoid up, and forwarded into the cervical oesophagus. Secretions were sucked out and checked for a foreign object. Any signs of pathology that could be caused by a retained foreign body (esophageal webs, strictures) were looked for. To remove the foreign object, use of lengthy gripping forceps was needed. Piecemeal, using soft objects, this was accomplished through the scope's lumen. The scope and grasper were retracted together to remove heavy, solid objects from the end of the scope. The endoscope was inserted to check for damage to the lumen at the foreign body's removal site and to make sure there was no more blockage distal to the foreign body once it was removed.

**Group B:** 20 patients underwent conservative management; these patients were followed up by X-ray chest and abdomen; abdomen ultrasound and CBC.

**Ethical Approval:** The trial was approved by the Ethics Committee of Al-Azhar University in Assiut. Adult patients and caregivers of children participants were provided with all relevant background material. Each person or caregiver of a child who took part in the research provided written consent after being fully advised of the risks involved. All procedures used in this study have been performed in conformity with the principles outlined in the Declaration of Helsinki, which outline the ethical guidelines to be followed while conducting research involving human subjects.

**Statistical analysis**

The data were analysed using SPSS version 24 (Statistical Package for the Social Sciences). The quantitative information was presented as a mean and standard deviation (SD). Qualitative information was presented as frequency and percentages. Chi-square test was utilised to compare qualitative data between groups of study. P-value < 0.05 was considered significant and P-value < 0.001 was considered as highly significant.

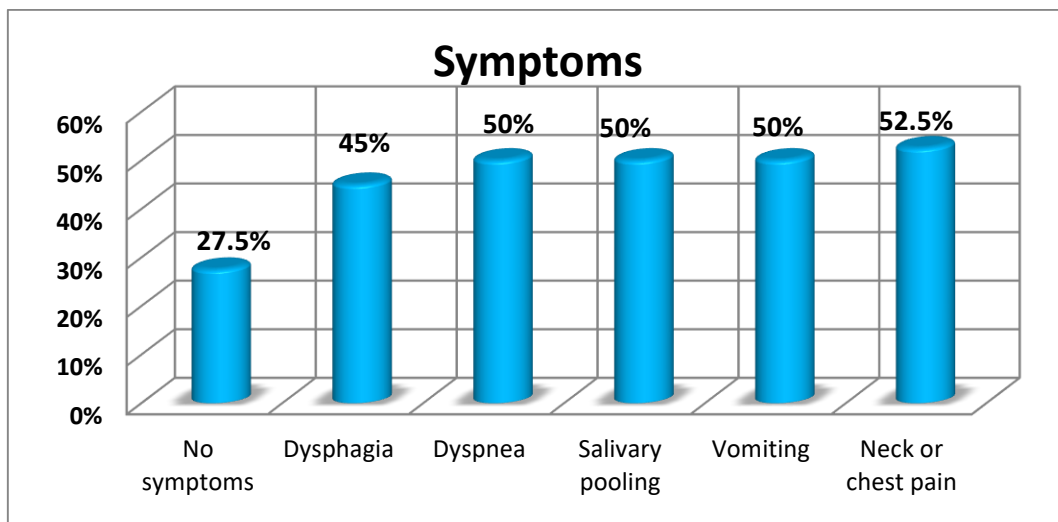
**RESULTS**

Table (1) describes the demographic information of all patients investigated. The mean age of all patients analyzed was 8.3 ± 6.3 years. There were 24 males (60%).

**Table (1): Description of demographic data in all studied patients**

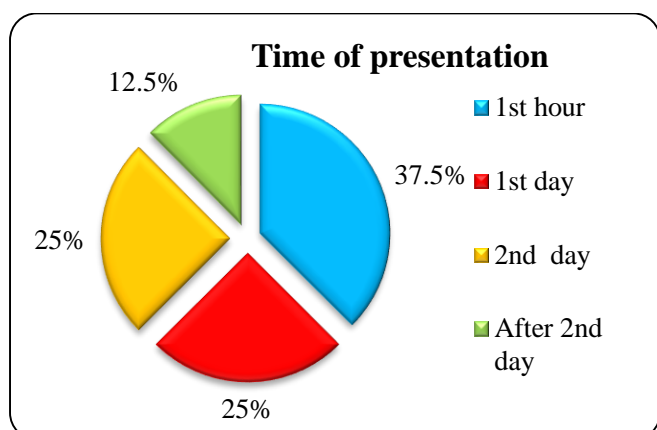
		Studied patients (N = 40)	
Age (years)	Mean ±SD	8.3 ± 6.3	
	Min - Max	1 – 22	
Sex	Male	24	60%
	Female	16	40%

The most common symptom was neck / chest pain in 21 patients (52.5%) (Figure 5)



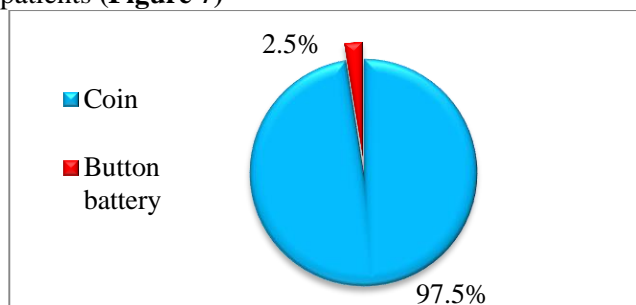
**Figure (5): Description of symptoms in all studied patients**

Figure 6 shows that the most common time of presentation was in the 1st hour.



**Figure (6):** Description of time of presentation in all studied patients.

Coin was the most common foreign body in 97.5% of patients (Figure 7)



**Figure (7):** Description of foreign body type in all studied patients.

Table 2 shows the description of foreign X-Ray results in all studied patients. As regard site, it was in esophagus in 13 patients (32.5%), in oro-pharyngeal in 8 patients (20%), in the stomach in 5 patients (12.5%), in the ascending colon in 3 patients (7.5%), in the transverse colon in 7 patients (17.5%) and in the descending colon in 4 patients (10%). As regard shape, it was round in 39 patients (97.5%) and circular in 1 patient (2.5%).

**Table (2):** Description of X-Ray results in all studied patients.

		Studied patients (N = 40)	
X-Ray site	Esophagus	13	32.5%
	Oro-pharyngeal	8	20%
	Stomach	5	12.5%
	Ascending Colon	3	7.5%
	Transverse Colon	7	17.5%
	Descending Colon	4	10%
X-Ray shape	Rounded	39	97.5%
	Circular	1	2.5%

Table 3 shows highly statistically significant increased percentage of infection in conservative group when compared with endoscopic group. There was no statistically significant difference between endoscopic and conservative treatment as regard laceration of mucosa, esophageal perforation, retropharyngeal abscess, esophageal obstruction, esophageal necrosis, esophageal stricture and tracheoesophageal fistula.

**Table (3):** Comparison of complications as regard applied treatment

	Treatment				Stat. test	P-value
	Endoscopic (N = 20)		Conservative (N = 20)			
Laceration of mucosa	1	5%	0	0%	1.02	0.311 NS
Esophageal perforation	2	10%	0	0%	2.1	0.147 NS
Infection	1	5%	15	75%	20.42	< 0.001 HS
Retropharyngeal Abscess	0	0%	0	0%	----	----
Esophageal obstruction	1	5%	0	0%	1.02	0.311 NS
Esophageal necrosis	2	10%	0	0%	2.1	0.147 NS
Esophageal stricture	1	5%	0	0%	1.02	0.311 NS
Tracheoesophageal fistula	1	5%	0	0%	1.02	0.311 NS

NS: Non-significant, HS: Highly significant

## DISCUSSION

Children frequently experience issues with foreign body ingestion. Among the many different types of objects found in such cases are coins, fish bones, pins, button batteries, magnets, and household items. The most common objects found in most countries were coins, followed by pins, and then fish bones. The most common age group affected was children between the ages of six months and six years (8).

In present study the age (Mean ±SD) (Min – Max) was (8.3 ± 6.3) (1 – 22) and males were (24 – 60 %) and females (16 -40%)

Khorana *et al.* (9) found that median (Interquartile range) of age was 43.5 (21–72). Average age was 43.5 months (range was 6 to 180 months). Of 194 occurrences, 122 (57.7%) occurred in patients younger than 48 months, and 82 occurred in individuals older than 48 months (42.2) The peak age of ingestion was between one and two years old, which accounted for 21% of all cases. And males were (104 patient -53.61%) and females (90 patient -46.39 %)

The ages of the kids studied by Macpherson *et al.* (10) ranged from 6 months to 17 years. Sixty-five (65%) were younger children (aged 6 months to 2 years), twenty-four (20%) were children (aged 2 to 5 years), and nineteen (15%) were adults (aged 5 years and beyond).

In our study no symptoms were found in (11 patient-27.5%), dysphagia in (18 patients -45%), dyspnea (20 patients - 50%), salivary pooling (20 patients -50%), vomiting (20 patient -50%), and neck or chest pain in (21 patients -52.5%). **Khorana et al.**<sup>(9)</sup> found that no symptoms were found in (86 patient-44.33%), in dysphagia (27 patients - 13.92 %), dyspnea (29 patient - 14.95%), salivary pooling (12 patient - 6.19 %), vomiting (45 patient - 23.20 %), and neck or chest pain in (6 patient - 3.09 %). **Macpherson et al.**<sup>(10)</sup> found that no symptoms were found in (25 patient-20%), dysphagia in (31 patients – 26%), dyspnea (2 patients - 2%), salivary pooling (19 patient- 16%), vomiting (17 patient-14%), and neck or chest pain in (13 patient-11%).

In present study swallowing of coins occurred in (39 patient -97.5%) and button battery in (1 patient – 2.5%). **Khorana et al.**<sup>(9)</sup> found that coin swallowing in (80 patient- 41.24%) and button battery (21 patient-15.46 %)

The view of the X-ray depends on the part of the body of concern. If location is not possible by X-ray, any radiolucent objects could be found using an esophagogram or computer tomography (CT) scan. Endoscopic removal can be carried out promptly in symptomatic cases and when the location of the foreign body is within endoscopic reach. Other investigations, such as ultrasonography and magnetic resonance imaging are unhelpful in this field<sup>(11)</sup>.

In present study the X-ray showed that site of the foreign body was in esophagus (13 patient -32.5%) oropharyngeal (8 patient -20%), stomach (5 patients - 12.5%), ascending colon (3 patient -7.5%), transverse colon (7 patient-17.5%), and descending colon (4 patient-10%), and X-ray showed that the shape of the foreign body was round in (37 patient -92.5%) and circular in (1 patient -2.5%). **Khorana et al.**<sup>(9)</sup> found that the site of the foreign according to the X-ray was in esophagus (71 patient - 36.98%), tonsil (2 patient - 1.04 %), stomach (56 patient- 29.17%), jejunum-ileum (13 patient- 6.77 %), duodenum (6 patient- 3.13%), colon (9 patient- 4.69 %), and others (35 patient- 18.23 %), and X-ray showed that the shape of the foreign body was round in (33 patient -17.01%), and circular (22 patient-11.34%). **Macpherson et al.**<sup>(10)</sup> found that the X-ray showed that eighty-five (69%) of the foreign bodies were lodged in the upper esophagus from the cricopharynx.

In present study laceration of mucosa (1 patient-2.5%), esophageal perforation (2 patient -5%), infection (16 patients -40%), retropharyngeal abscess (0 patient - 0%), esophageal obstruction (1 patient-2.5%), esophageal necrosis (2 patient 5%), esophageal stricture (1 patient-2.5%), tracheoesophageal fistula (1 patient-2.5%) were the complications as regard the applied treatment. **Khorana et al.**<sup>(9)</sup> found eighteen (9.3%) cases of GI mucosal abrasions or bowel blockages occurred before therapy was administered. Symptoms of mucosal injury in the mouth, oesophagus, and

stomach included redness, abrasion, ulceration, and necrosis. The majority of pre-treatment injuries involved a coin (8/18 cases) that was lodged in the oesophagus. A meal bolus was the sole cause of a bowel blockage case.

**Macpherson et al.**<sup>(10)</sup> found that three of the individuals in the series developed serious difficulties after swallowing foreign objects. Eight (7%) of the foreign bodies passed spontaneously; however, one child died from an aorto-esophageal fistula caused by a retained safety pin, another child had true and false esophageal diverticula caused by a retained tiddlywink, and a third child had a retained coin that migrated through the esophageal wall to lodge between the trachea and oesophagus. Five patients with documented coin retentions were transferred from referring hospitals; two of these patients had chest radiographs taken after arrival that showed the coin in the stomach; three patients had empty oesophagi upon esophagoscopy; and three patients had foreign bodies seen passing from the distal oesophagus into the stomach following the ingestion of peanut butter.

In present study the patients underwent oesophagoscopy (20 patients-50%), and patients underwent conservative management (20 patients-50%). **Khorana et al.**<sup>(9)</sup> found that endoscopic removal of foreign body occurred in (69 patients - 35.57 %), spontaneous or conservative management (117 patients-60.31%), surgical removal (2 patients - 1.03%), and others in (6 patients- 3.09%).

## CONCLUSION

Children under the age of three are disproportionately affected by the common occurrence of foreign body (FB) ingestion. Eighty to ninety percent of GI FBs are expelled normally without intervention (i.e., without problems), ten to twenty percent are removed endoscopically, and one percent necessitate open surgery. Hence, for pediatric gastroenterologists, FB ingestion is a major clinical challenge.

## DECLARATIONS

- **Consent for publication:** I attest that all authors have agreed to submit the work.
- **Availability of data and material:** Available
- **Funding:** No fund
- **Conflicts of interest:** no conflicts of interest.

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