

Endoscopic management of ingested foreign bodies and food impaction in esophagus

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Abstract

Foreign body (FB) in the esophagus is a common emergency presentation in all age groups, especially in children. The immediate risk can range from a minimal one to a life-threatening scenario. Food impactions generally occur when there is altered anatomy (rings, webs or strictures) or motility disorders of the esophagus. The initial management approach includes a thorough history and physical examination followed by radiological investigations. Flexible endoscopy not only confirms the diagnosis but also is the therapeutic modality of choice for removing FBs and relieving the obstruction. This review aims to provide a comprehensive approach towards endoscopic management of esophageal FBs based on current literature and personal experience. The management problems associated with different types of FBs have also been highlighted.

Key words

Endoscopic management, esophagus, food bolus impaction, foreign body

Introduction

Foreign body (FB) ingestion and esophageal food impaction are common gastrointestinal (GI) emergencies, occurring mostly in the pediatric population, between 6 months and 6 years.^[1-4] Children have an oro-lingual curiosity and are more prone to accidental ingestion. In adults, FB ingestion occurs more commonly in those with psychiatric disorders, developmental delay, alcohol intoxication, and incarcerated individuals seeking secondary gain.^[1,5-8] In a review of 262 adult FB ingestion cases, 92% were intentional, and 85% of patients had an underlying psychiatric illness.^[5] Patients with underlying esophageal pathology often present with food bolus impaction.^[9] Patients with history of gastrointestinal (GI) surgery or congenital malformation are also at increased risk for FB impaction.^[10,11] Certain occupations like carpenters and

tailors are more prone for FB ingestion as they hold nails and pins in their mouth during work. Esophageal food impactions account for most accidental encounters, with the occasional misadventure of an object being in or near one's mouth during a sudden trauma such as a motor vehicle accident, causing ingestion. Most of the foreign bodies pass uneventfully once they cross esophagus.^[12,13]

Epidemiology

Different types of ingested esophageal FB have been reported depending on the age.^[14-16] In a study by Roura *et al.*, coins accounted for 66% of the upper GI FBs found in patients <10 years of age; in contrast, food boluses accounted for 60% of upper GI FBs in those over 11 years old.^[17] In this series of 242 patients, FBs were lodged in pharynx and esophagus in 39 and 181 patients respectively. Coins were also the most common esophageal FB in a series of 170 patients from India followed by food boluses, dentures, sharp FBs and unusual FBs.^[18]

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Pathophysiology

Impaction, obstruction or perforation by ingested FB is determined by anatomical narrowing or angulations (upper esophageal sphincter, aortic arch, left main bronchus and gastro-esophageal junction), the physical characteristics of the FB (size, shape, and composition) and dwelling time. Common sites for obstruction by an ingested FB mostly include the cricopharyngeal area, middle one-third of the esophagus and lower esophageal sphincter. Age has also been described as one of determining factors for spontaneous passage of esophageal FBs; it can be as low as 12% in children.^[19] Complications occur are more common with sharp objects which cause a perforation in 15–35% and with disc batteries due to their electric current and lye leak.^[1,20]

Presenting Symptoms and Signs

Most of the older children and adults can identify the ingestion and discomfort. However, the localization of discomfort usually does not correlate with the site of impaction. Connolly *et al.* found only 30–40% correct localization of FB in the esophagus.^[21] Young children, mentally impaired adults and those with the psychiatric illness usually present with choking, refusal to eat, vomiting, drooling, wheezing, blood-stained saliva and respiratory distress.^[3,8] In these cases a history of FB ingestion can be obtained from parents or caretakers, however, in up to 40% of FBs, there may be no history of ingestion.^[22] It is also important to determine the duration of lodgment of FB. Longer time of lodgment, especially more than 24 h, predispose to erosion and perforation. In case of perforation, neck swelling, erythema, tenderness or crepitus may be present.

Diagnosis

Biplaner neck and chest radiographs should be the first investigation done in a case of suspected lodged esophageal FB [Figure 1]. It can identify and confirm the location of

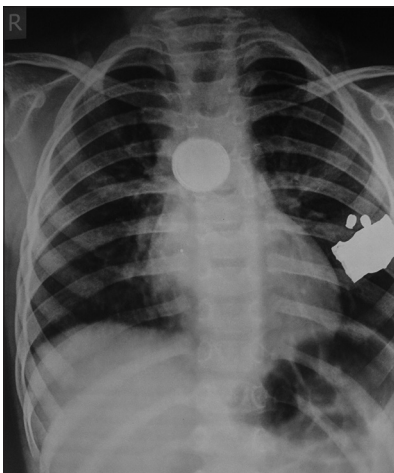


Figure 1: X-ray chest showing a coin lodged in esophagus in a 6-year-old child

radiopaque esophageal FBs and in case of perforation, free mediastinal, subcutaneous air in the neck or peritoneal air may be appreciated. Furthermore, if patient presents with a radiograph showing FB and some hours have passed, a repeat radiograph helps in confirming the current position and may obviate the need for a consequent therapeutic endoscopy. However, fish or chicken bones, wood, plastic, glass, thin metal objects and impacted dentures^[23] are not readily seen on plane radiographs. A contrast examination may help in locating radiolucent FBs, but aspiration risk, and difficulty in performing subsequent endoscopy usually precludes such examinations. Computed tomography (CT) scan may be useful with three dimensional reconstructions.^[24] Metal detectors can localize most of the swallowed metal objects and may be helpful in pediatric patients.^[25] Flexible endoscopy has the diagnostic and therapeutic potential for esophageal FBs and should be done urgently when there is respiratory distress due to airway compromise or when a complete obstruction is suspected because of aspiration of internal secretions into the trachea. It should also be done in cases of persistent esophageal symptoms even in the presence of negative radiological images.^[26]

Management

Initial management

Initial management should begin with the careful history and physical examination. Assessment of the patient's ventilatory status and an airway evaluation should be done. Those who are unable to manage their secretions are at high aspiration risk and require urgent management. Endotracheal intubation under general anesthesia may be required for patients with objects that are difficult to remove, patients with multiple objects and if rigid endoscopy is required. Pediatric patients often require general anesthesia and endotracheal intubation because smaller and more compliant airways are at higher risk of airway obstruction during endoscopy. However, most adult cases of esophageal FB ingestion can be managed with conscious sedation.

Medical management

A number of medical therapies have been considered as the primary treatment of food impactions. Among all, glucagon, a smooth muscle relaxant, is the most widely used and studied drug. Success with glucagon ranges from 12% to 58% for treating food impactions.^[27,28] Glucagon may cause nausea, vomiting, and abdominal distention. Nifedipine and nitroglycerine are generally not recommended because of their hypotension related side effects. The use of gas forming agents like carbonated beverages or preparations containing soda bicarbonate and citrate, have been described in the literature, however, their efficacy is doubtful, and perforations have been reported to occur with these agents. Similarly, meat tenderizer and papain are not recommended due to their lack of efficacy and risk of complication like perforation or mediastinitis.^[29]

Endoscopic management

The need for and the timing of endoscopic intervention for esophageal FB ingestion depends on the patient's age, size, shape and content of the FB, and the time since its ingestion. The risk of aspiration, obstruction or perforation determines the timing of endoscopy. Esophageal foreign objects and food impactions should be removed within 24 h because delay decreases the likelihood of successful removal and increases the risk of complications including perforation.^[30,31] Once the FB body has entered the stomach, conservative outpatient management is appropriate as most asymptomatic gastric foreign bodies pass in 4–6 days.^[2-4,32]

Equipments

Endoscopes

Although rigid endoscopy may be helpful for proximal FB impacted at the level of the upper esophageal sphincter or hypopharyngeal region, most of the ingested foreign bodies are best treated with flexible endoscopes. Flexible endoscopes have a high success rate and can be performed with conscious sedation in most adults. In a retrospective study of consecutive patients undergoing endoscopy for removal of impacted esophageal FBs, no perforations occurred in 76 cases in whom flexible endoscopy was performed compared with 2 perforations in 63 cases (3.2%, $P < 0.002$) in whom rigid endoscopy was performed.^[33] However, rigid endoscopy has the advantage of protecting the airway without the use of an overtube.

Retrieval devices

In the present era, many different types of retrieval devices are available such as, rat-tooth and alligator forceps, polypectomy snares, polyp graspers, dormia baskets, retrieval nets, magnetic probes, and friction-fit adaptors or banding caps. Retrieval devices are selected based on the size and shape of the ingested object and the ease of using the device.

Overtubes

Overtube is used to protect the airway and facilitate passage of the endoscope during removal of multiple objects or during piecemeal removal of a food impaction. An overtube also protects the esophageal mucosa from lacerations during retrieval of sharp objects.^[34] Overtubes come in standard as well as longer (45–60 cm) lengths. FB protector hood can also be used to protect the esophagus during removal of sharp or pointed objects if the overtube is not available.

Types of Foreign Body

Sharp objects

Chicken and fish bones, straightened paperclips, toothpicks, needles and bread bag clips are the most common sharp foreign bodies in clinical practice. Sharp pointed objects lodged in the esophagus are a medical emergency. Many of the sharp-pointed objects are not visible on a radiograph, so endoscopy should

follow a negative radiologic examination. Direct laryngoscopy should be used to remove objects lodged at or above the cricopharynx. Rigid or flexible endoscopy may be performed when laryngoscopy is unsuccessful or for the treatment of objects lodged below the cricopharynx. Although the majority of sharp-pointed objects, once in the stomach, pass without any incident, however, the risk of a complication caused by a sharp pointed object is as high as 35%.^[1,12,35,36] Endoscopic retrieval of sharp objects may be accomplished with retrieval forceps, retrieval net, or a polypectomy snare.^[37] The risk of mucosal injury during retrieval can be minimized by orienting the object with its sharp point trailing during extraction, by using an overtube, or by fitting the endoscope with a protector hood.^[17,36,38] We have been using a magnet attached to a steel guidewire and transparent cylinder of variceal band ligator for removal of magnetic sharp foreign bodies and have not encountered any major complication over the past 15 years [Figure 2]. This technique is especially useful for centers where costly instruments may not be available.

Short blunt objects

Coins are the most common ingested short, blunt objects, especially by children. They can be removed with a FB forceps (e.g., rat-tooth or alligator) or by a retrieval net.^[1,36] We devised a novel instrument for removal of magnetic small blunt objects by combining two 1.5 cm magnetic discs attached to spring and steel wire and Teflon tube used as a sleeve.^[39] Objects not easily grasped in the esophagus may be advanced into the stomach where retrieval may be facilitated. A “2 in 1 instrument,” made up of a looped basket supported by magnets may be especially helpful in removal of magnetic FBs.^[38]

Long objects

Objects longer than 6 cm, such as toothbrushes and eating utensils, pose a specific risk of having difficulty in negotiating acute angles. The use of overtubes is helpful in such situations.

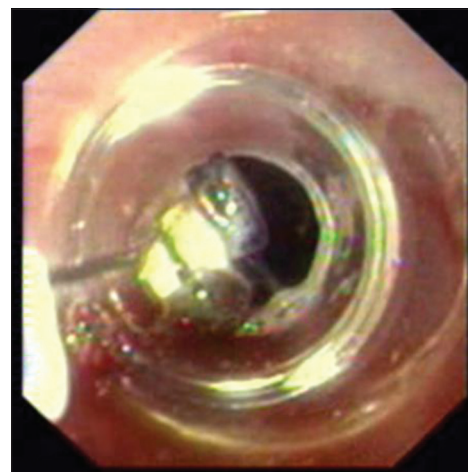


Figure 2: Removal of metallic safety pin from esophagus: An variceal band ligator cap is used over the scope after magnetic tipped guide wire (Two 1.5 cm magnetic discs attached to a spring tip steel wire and Teflon tube used as a sleeve) has been passed through biopsy channel. The pin is held from its blunt edge with sharp end being distal

The object can be grasped with a snare or basket and maneuvered into the overtube. Following this, the entire apparatus (i.e., FB, overtube, and endoscope) can be withdrawn together to avoid losing the grasp of the object within the overtube.^[40]

Disk batteries

Most of the ingested batteries are from hearing aids, watches, games, toys and calculators. Children younger than 5 years of age are most likely to ingest such button batteries.^[41] When both poles of the battery come into contact with the mucosa, electrical conduction may result in corrosive injury, necrosis, and perforation. Furthermore, these agents contain either metallic salts (mercuric oxide, silver oxide, zinc oxide or lithium oxide) or alkaline fluids (sodium or potassium hydroxide), which may leak into the esophageal lumen and cause necrosis. Therefore, post radiographic examination, batteries lodged in the esophagus should be removed at the earliest. Most often a stone retrieval basket or retrieval net is used as these are mostly successful in retrieving the batteries.^[37] Acid suppression, as well as cathartics, also have no proven role in the management of battery ingestion.^[42]

Magnets

Magnet ingestion can cause severe GI injury leading to death. The basic pathophysiology involves attractive force between

magnets or between a magnet and an ingested metal object, trapping a portion of bowel wall between the 2 objects. Consequently, the pressure between the two objects can lead to bowel wall necrosis with fistula formation, perforation, obstruction or mediastinitis.^[41] Magnets should, therefore, be removed as soon as possible.

Narcotic packets

Body bagging or body packing, used for drug trafficking of narcotic packets can be seen in both children and adults.^[43] Narcotics contained in balloons or latex condoms can be seen on CT scan or occasionally on radiographs. This is only one of the few indications where endoscopic removal is contraindicated as rupture and leakage can be fatal, and they should be allowed to progress naturally through the GI tract. Surgical intervention is indicated when packets fail to progress or if signs of obstruction are present.

Follow up care and prevention

Most of the foreign bodies and food impactions can be managed in outdoor settings and patients can be discharged after observation for few hours. Repeat intentional ingestions can occur and risk factors identified have been being a prisoner, male sex and having a psychiatric disorder with an odds ratio of 4.2, 3.8, and 2.9, respectively.^[44]

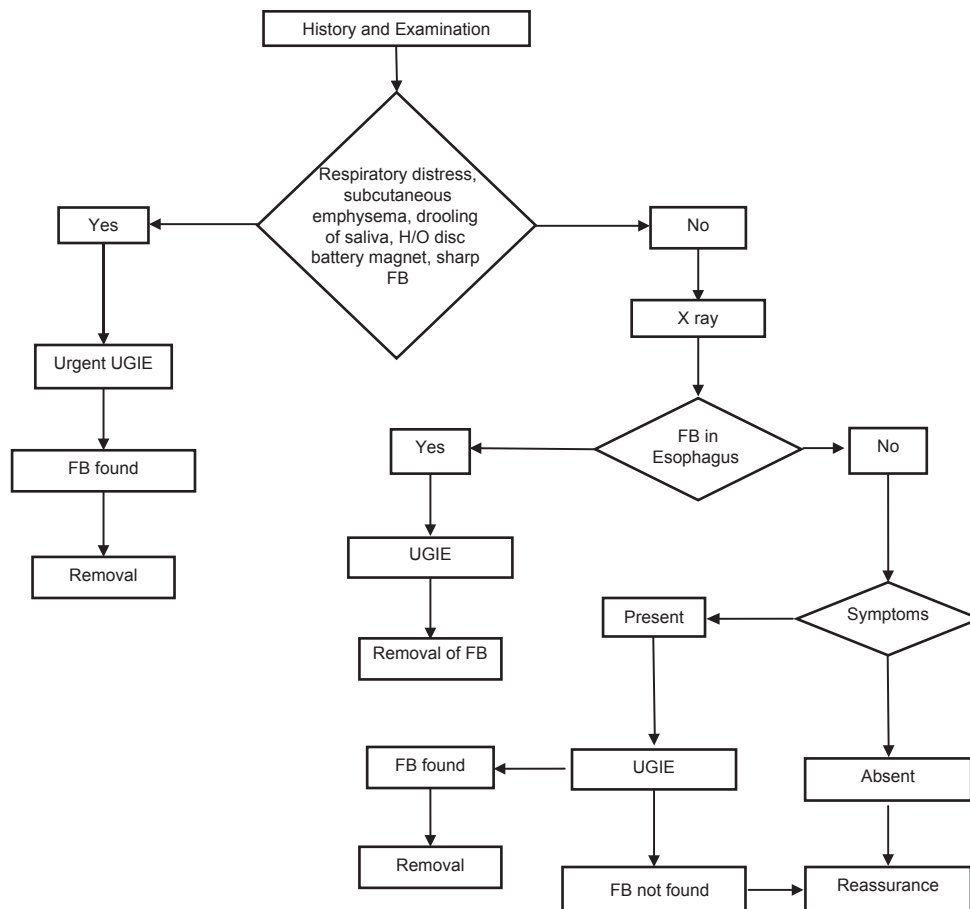


Figure 3: Approach to management of esophageal foreign bodies

Conclusion

Esophageal FBs warrant an urgent attention regarding airway and respiratory symptom assessment. History and examination should be followed by an immediate roentgenography, and an algorithmic approach can then be followed [Figure 3]. All FB lodged in the esophagus, especially for more than 24 h, need urgent intervention and choosing the correct accessory avoid most troubles. But if an FB passes esophagus, it is very likely to pass through the rest of GI tract.

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Conflicts of interest

There are no conflicts of interest.

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