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Endoscopic Management of Ingested Foreign Bodies and Food Impactions

ABSTRACT

Endoscopy plays a major role in the management of foreign bodies and food impactions. Because of their frequent occurrence and potential for complications, it is important for the gastroenterology nurse and associate to gain an understanding of the incidence, diagnosis, and management of patients who present with ingested foreign bodies or food impaction. This article summarizes the clinical approach to patient: assessment, preparation for endoscopic procedure, preparation of endoscopic accessories, and follow-up care. Finally, an interesting case presentation highlights key components of caring for patients requiring endoscopic intervention.

Upper gastrointestinal (GI) foreign bodies are a common occurrence. Foreign bodies may be the result of intentional or accidental ingestion. The most common groups of patients who intentionally ingest foreign objects include psychiatric patients and prisoners. This patient population is often the most challenging as they may repeatedly ingest multiple or complex objects (Ginsberg & Pfau, 2010). Accidental ingestions are most common in children between the ages of 6 months and 3 years. In adults, unintentional ingestion may occur more frequently in certain occupations such as roofers, carpenters, seamstresses, and tailors with accidental ingestion of nails or pins, respectively. Edentulous adults and those with dentures or dental bridgework and adults with altered mental status or intoxication are also at risk for unintentional ingestion, that is, "quarters" drinking game (Ginsberg & Pfau, 2010).

Another type of foreign body is the impacted food bolus in the esophagus, which frequently requires endoscopic intervention. The majority of these patients are found to have esophageal pathology such as a peptic stricture, Schatzki's ring, achalasia, and eosinophilic esophagitis. Altered surgical anatomy and motility disorders may also be contributing factors for food impaction (Ginsberg & Pfau, 2010).

Pathophysiology

Although the majority of foreign bodies will pass through the GI tract without harm, it is important to realize that both foreign bodies and food impactions can result in serious complications such as obstruction, perforation, and death (Ginsberg & Pfau, 2010). Recognizing the potential for complication will aid in planning for appropriate endoscopic intervention. Areas of luminal narrowing and angulation in the GI tract may result in impaction of foreign bodies, thus increasing the risk of obstruction and perforation (Figure 1).

Impacted foreign bodies in the oropharynx typically are small, sharp objects such as fish bones, small chicken bones, or toothpicks (Anderson & Dean, 2011; Ginsberg & Pfau, 2010). Management of these objects includes direct visualization with forceps removal. Laryngoscopy is performed when the object is beyond visualization. Radiographs may be helpful in localizing the object if radiopaque (Anderson & Dean, 2011).

Foreign body and food impactions in the esophagus have the highest risk for complications such as perforation, abscess, and mediastinitis. The longer the object remains in the esophagus, the greater the potential for

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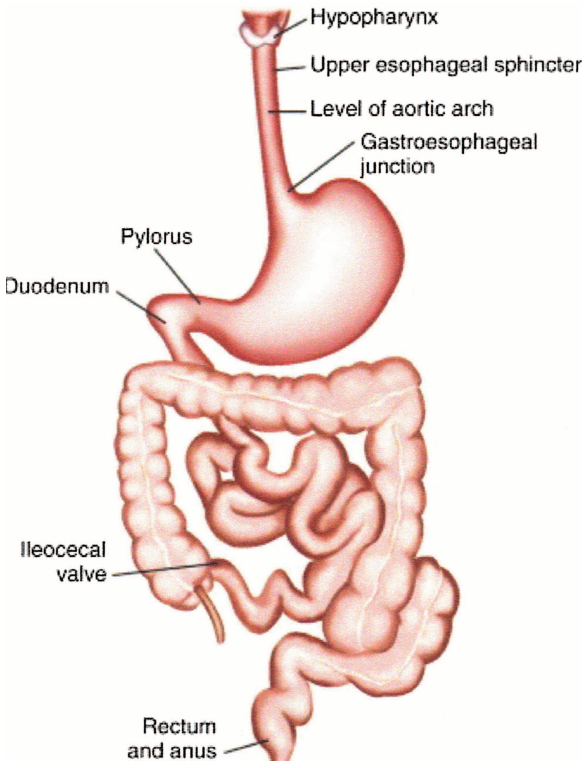

FIGURE 1. Gastrointestinal areas of luminal narrowing and angulation that predispose to foreign body impaction and obstruction. This image was published in *Sleisenger and Fordtran's Gastrointestinal and Liver Disease*, 9th ed. Ginsberg, G. G., & Pfau, P. R. Foreign bodies, bezoars and caustic ingestions. Feldman, M., Friedman, L. S., and Brandt, L. J. (Eds.). p. 398. Philadelphia, PA: Saunders. Copyright © 2010 Elsevier (2010). Reprinted with permission.

developing an adverse event. Over time, mucosal edema can develop and progress to necrosis, infection, and perforation (Anderson & Dean, 2011). Esophageal impactions should be removed within 24 hours (Ikenberry et al., 2011).

The vast majority of small, blunt objects that enter the stomach will pass uneventfully through the GI tract (Anderson & Dean, 2011; Ginsberg & Pfau, 2010). Endoscopic removal should be performed when long (>5 cm) and large diameter (>2 cm) objects are ingested because of their potential inability to traverse the duodenal sweep (Anderson & Dean, 2011).

The ileocecal valve also represents an area where foreign objects may lodge. Intestinal peristalsis and flow of intestinal contents tend to keep the object in the center of the lumen; sharp objects tend to turn in such a way that the blunt end leads and the sharp end trails (Webb, 1995). Conservative management includes clinical monitoring and daily radiographs; surgical consultation should be considered for instances where there is no progression of the object over a 3-day period. Urgent surgical removal should be considered for those who are symptomatic (Anderson & Dean, 2011; Webb, 1995).

Diagnosis

History and Physical Assessment

Obtaining a history from the patient (caregiver or witness) regarding the timing and type of ingestion is helpful in determining the appropriate management. This patient history should also include a query of prior episodes of foreign body ingestion or food impaction, history of dysphagia, history of motility disorders, and prior GI surgical procedures. Physical assessment should include observation for drooling (suggestive of complete esophageal obstruction). An assessment of the airway and breathing status should be performed. The neck and chest should be examined to assess for crepitus and swelling, as these findings may indicate the presence of a perforation in the esophagus. An abdominal examination should also be performed to obtain a baseline assessment and evaluate for signs of obstruction or perforation.

Management

Radiographic Imaging

Radiographs of the neck, chest, or abdomen may be helpful in identifying the presence, type, number, and location of suspected foreign bodies, especially in those situations where the patient is noncommunicative. The films may also aid in identifying complications such as free air, aspiration, or subcutaneous emphysema. For suspected esophageal foreign bodies, anteroposterior and lateral films should be obtained. The lateral views will aid in determining whether the object is lodged in the esophagus versus the trachea (Ginsberg & Pfau, 2010). The American Society for Gastrointestinal Endoscopy (ASGE) practice guidelines recommend avoiding contrast radiographic examinations prior to removal of foreign objects or food impactions (Ikenberry et al., 2011).

Timing for Endoscopy

The need and timing for endoscopy are dependent on several important clinical issues: age and overall condition of the patient, type and location of the foreign body or food impaction, and perhaps most important, the availability of an expert team of medical providers (gastroenterologists, anesthesiologists, surgeons, nurses, and support staff) to intervene. According to the ASGE guidelines, emergent endoscopy should be performed on patients who cannot manage their secretions

(signifies complete esophageal obstruction), and patients who have disk batteries or sharp-pointed objects lodged in the esophagus.

Urgent endoscopy should be performed on patients with nonsharp objects in the esophagus (within 24 hours), esophageal food impaction without complete obstruction (within 24 hours), sharp-pointed objects in the stomach or duodenum, objects greater than 6 cm in length at or above the duodenum, and magnets within the reach of the endoscope. Nonurgent endoscopy can be performed on asymptomatic patients with coins in the esophagus (12–24 hours) and objects in the stomach with diameter greater than 2.5 cm. Disk and cylindrical batteries in the stomach of the asymptomatic patient should be removed if they do not progress in 48 hours (Ikenberry et al., 2011).

When Not to Do Endoscopy

Internal concealment of illegal drugs ("body packers," "drug mules," "body stuffers") may be seen in areas of high drug trafficking. The body packer or drug mule will ingest drugs in carefully prepared packages, with the goal of being able to safely pass through the entire GI tract. In contrast, the body stuffer typically will ingest drugs in a hurry, often in times of an impending drug bust, not allowing time for careful packaging. Regardless, multiple packets are typically swallowed, which poses a risk for obstruction and rupture, respectively. These packets can usually be detected on radiographs or computed tomographic scans. Attempt at endoscopic removal should not be entertained because of the extremely high risk of the endoscopic accessory rupturing the packet, ultimately leading to drug overdose. These patients should be managed conservatively with serial radiographs and monitoring toxicology levels. Surgery is the treatment of choice for removal (Ginsberg & Pfau, 2010; Webb, 1995).

Equipment

Endoscopes

Flexible endoscopes provide a high success rate for safely removing foreign bodies and food impactions. For objects impacted at the level of the hypopharynx or upper esophageal sphincter, rigid or flexible laryngoscopy may be more beneficial (Ikenberry et al., 2011).

Overtubes

Overtubes serve three important purposes during endoscopic assisted retrieval. First, they provide airway protection so foreign bodies are not dropped into the trachea upon removal. Second, they facilitate passage of the endoscope, especially when multiple intubations are necessary to remove the object(s). And third, they provide mucosal protection from injury when removing sharp or pointed objects (Bounds, 2006; Tierney et al., 2009). Overtubes come in esophageal (25 cm) and gastric (50 cm) lengths. A careful review of the manufacturer's instructions for correct assembly should take place before using. The author suggests doing an ex vivo assembly and "dry run" before performing the procedure on the patient.

Protector Hoods

Protector hoods are commercially available and may be used to remove sharp objects located in the stomach. The hood is a bell-shaped latex device that, after being placing on the tip of the endoscope, is rolled back to expose the tip of the scope (Figure 2A). The scope is introduced into the stomach and once the foreign body is grasped and pulled back to the tip of endoscope, the endoscope is removed. The resistance at the lower esophageal sphincter unfurls the bell-shaped hood over the object, thus protecting the esophagus and pharynx during removal (Figure 2B) (Bounds, 2006; Ginsberg & Pfau, 2010).

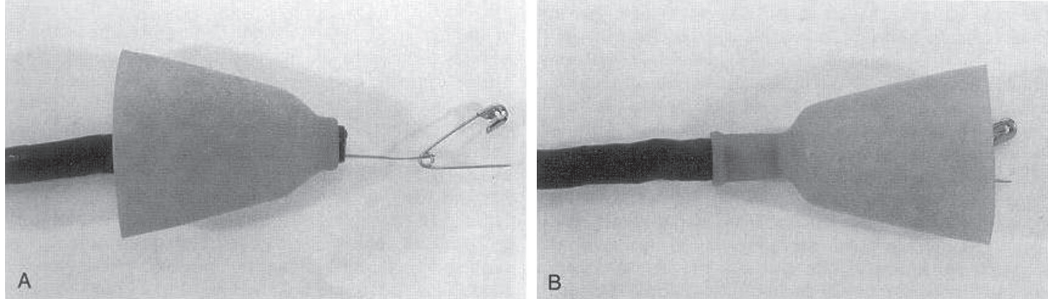

FIGURE 2. (A) Latex protector hood secured to the tip of the endoscope with the bell portion pulled back to expose the tip of the scope. (B) The act of pulling the endoscope through the lower esophageal sphincter furls the bell-shaped hood over the sharp object. This image was published in *Sleisenger and Fordtran's Gastrointestinal and Liver Disease*, 9th ed. Ginsberg, G. G., & Pfau, P. R. Foreign bodies, bezoars and caustic ingestions. Feldman, M., Friedman, L. S., and Brandt, L. J. (Eds.). p. 403. Philadelphia, PA: Saunders. Copyright © 2010 Elsevier (2010). Reprinted with permission.

Retrieval Nets/Polypectomy Snares

Retrieval nets are commercially available and consist of woven material affixed to a snare loop frame. They come in various sizes and operate similar to a standard polypectomy snare. The netting provides for a secure capture of the object(s) and safe removal without risk to the upper airway. In most situations, nets and polypectomy snares should not be used to remove sharp objects as there is less control in orienting and controlling the object for safe removal (Bounds, 2006).

Forceps

There are various retrieval forceps that are commercially available and should be part of the armamentarium: shark tooth, rat tooth, alligator, stent retrieval, and pronged grasping forceps. These devices are often preferred for retrieval of objects such as coins, dentures, and certain sharp objects (Bounds, 2006). The author suggests having Kelly or McGill forceps readily available for removal of objects in the hypopharynx.

Baskets

Stone retrieval baskets and spiral baskets are available and may be helpful in the retrieval of foreign bodies (Diehl et al., 2009). Similar to net retrieval devices, baskets should not be used to remove sharp objects due to a decreased ability to orient and control the object upon endoscope withdrawal (Bounds, 2006).

Clear Distal Scope Caps

Clear plastic caps, similar to those on endoscopic ligation devices, mounted onto the tip of the endoscope have been demonstrated to be successful in removing food boluses. The bolus can be secured into the clear plastic cap with strong endoscopic suction and subsequently removed (Diehl et al., 2009).

Pharmacologic Therapies

Administration of glucagon may be helpful in esophageal food impactions as it relaxes the distal esophageal smooth muscle. This action may lead to spontaneous passage of the food bolus into the stomach. It is important to know that glucagon has no effect on the striated muscle of the proximal esophagus. Intravenous dosing ranges from 0.25 to 2.0 mg (Anderson & Dean, 2011).

Nitroglycerin and nifedipine have also been used in an attempt to reduce distal esophageal spasm and induce lower esophageal sphincter relaxation, which may facilitate passage of the object into the stomach. Either drug can be used in combination with glucagon. Nitroglycerin and nifedipine should not be used simultaneously secondary to the risk of profound hypotension. Dosing for these agents is sublingual nitroglycerin 1–2 (0.4 μg) tablets and 5–10 mg nifedipine (Anderson & Dean, 2011).

Gas-forming agents and carbonated beverages have been reported to be successful in the treatment of distal esophageal food impactions. Carbon dioxide is produced with ingestion, which can distend the esophagus and relax the lower esophageal sphincter, thus allowing the object to pass into the stomach (Anderson & Dean, 2011). The author advises against this practice as drinking liquid in the setting of an impacted food bolus may lead to aspiration.

The use of proteolytic enzymes (meat tenderizers, papain) is absolutely contraindicated in the setting of food bolus impaction in the esophagus. These enzymes can cause hypernatremia, mucosal erosion, and perforation (Ikenberry et al., 2011).

Review of Specific Foreign Bodies and Food Impactions

Sharp and Pointed Objects

For removal of sharp or pointed objects, retrieval is best achieved by the use of a grasping forcep. Jackson's axiom applies: "Advancing points puncture, trailing do not" (Webb, 1995, p. 43). Therefore, the object should be oriented in such a way that the blunt end leads and the pointed end trails to reduce the risk of mucosal laceration and perforation. Use of an overtube or a latex hood is recommended (Bounds, 2006; Ginsberg & Pfau, 2010; Webb, 1995).

Long Objects

As previously mentioned, objects longer than 5 cm have difficulty traversing the pylorus and duodenal sweep. Grasping forceps and polypectomy snares are used to orient the object in a longitudinal orientation for removal. The use of a long overtube should be considered (Ginsberg & Pfau, 2010).

Small Blunt Objects

Retrieval nets allow for secure capture and safe removal of small blunt objects without airway compromise. The use of standard biopsy forceps and polypectomy snares is not recommended because of the risk of losing the object in the hypopharynx, which could result in airway compromise (Bounds, 2006; Ginsberg & Pfau, 2010). If a net is not available, the author recommends the use of an esophageal overtube for airway protection during the extraction.

Food Bolus Impaction

Endoscopic treatment options for food bolus impactions involve either the extraction technique or the advancement technique. Extraction methods should be used in situations where complete obstruction exists. Extraction techniques include en bloc or piecemeal

removal with the use of forceps and retrieval nets. As previously mentioned, the use of a clear distal cap may facilitate removal. The ASGE recommends against attempts at pushing the object into the stomach without examination of the esophagus distal to the impaction (Ikenberry et al., 2011). Advancement technique may be accomplished by applying gentle pressure to the center of the bolus. This technique should be performed with extreme care because of the high probability of esophageal pathology and increased risk of perforation (Ikenberry et al., 2011). Airway protection with an overtube or endotracheal intubation should be provided before utilizing extraction techniques.

It is important for patients with esophageal pathology to receive follow-up care. Depending on the clinical situation, it may not be appropriate to biopsy or perform esophageal dilation at the time of the food bolus emergency. Elective endoscopy with biopsy or esophageal dilation can be performed at a later date in those with suspected eosinophilic esophagitis or an esophageal stricture. Motility studies may be indicated in situations where no specific pathology was found in a patient reporting continued symptoms of dysphagia.

Case Report

A 25-year-old woman with an extensive psychiatric history was receiving inpatient treatment at our psychiatric institute. The patient reported swallowing a serving spoon and was transported to our emergency department for evaluation. A radiograph of the chest and abdomen confirmed the presence of the metal spoon (Figure 3). The gastroenterology consult team was notified and a plan of care was implemented. A review of the medical record revealed multiple episodes of intentional ingestion of objects to include batteries, disposable pulse oximetry probes, pens, pen caps, and intravenous tubing among other objects. The patient gave us a reliable history of her most recent ingestion. Examination of the neck, chest, and abdomen revealed no signs of complication. We, therefore, proceeded with endoscopy for hopeful spoon extraction; general anesthesia was used for patient control and airway protection.

During our "ex vivo" practice run prior to attempted removal, we quickly learned that the spoon could not be oriented in a longitudinal axis with a forward viewing endoscope. Use of a side-viewing duodenoscope with snare capture enabled us to orient the spoon parallel to the shaft of the scope for withdrawal. Under fluoroscopic and endoscopic guidance, the spoon was successfully removed (Figure 4). Magill forceps aided in removing the spoon through the upper esophageal sphincter.

Although this was a very unusual case, several key points are illustrated and should be remembered when caring for any patient with foreign body(s) and/or food impaction: (a) perform a history and physical assessment; (b) assemble the interventional team: gastroenterologists, anesthesiologists, nurses, endoscopy assistants, and surgeons if necessary; (c) assemble and organize endoscopic accessories, and (d) perform an "ex vivo dry run."

At the author's institution, "foreign body kits" are kept within the department. These kits are stocked with

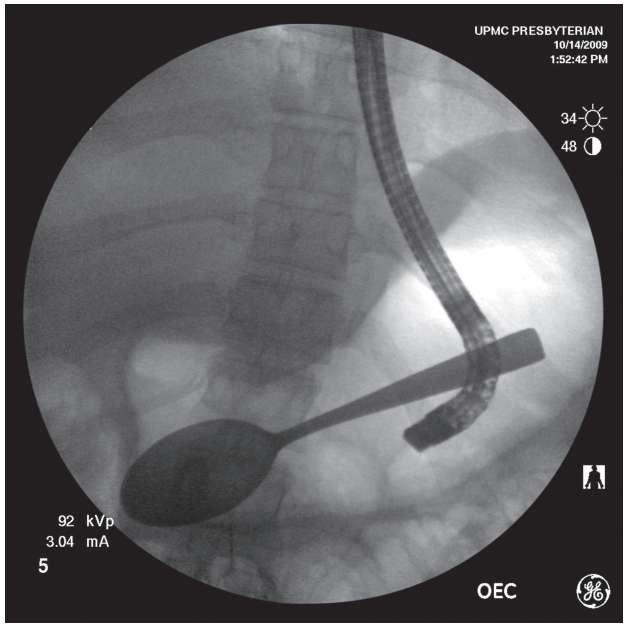

FIGURE 3. Fluoroscopic image of a complex and unusual ingested foreign body.

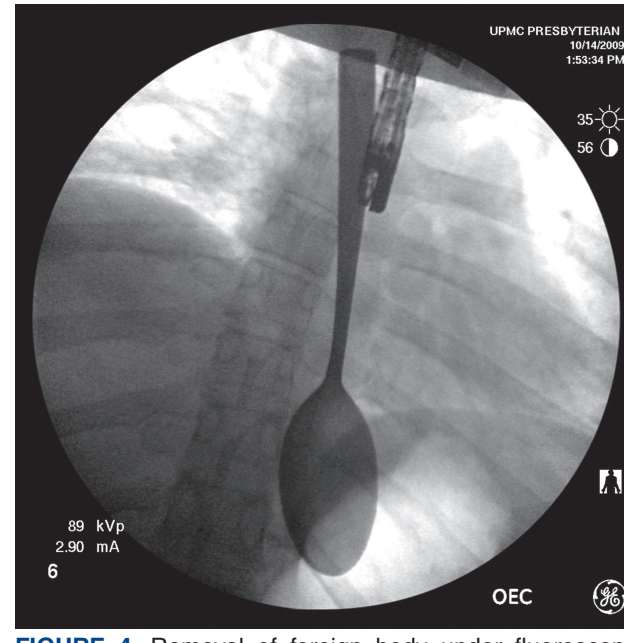

FIGURE 4. Removal of foreign body under fluoroscopic guidance using a polypectomy snare and side viewing duodenoscope.

FIGURE 5. Foreign body kit containing endoscopic accessories.

a variety of devices commonly utilized in extraction cases (Figure 5). The kits are checked for inventory every morning and restocked after each use (Figure 6). This practice has reduced the need for going on a "scavenger hunt" to look for accessories at the time of the emergency.

Conclusion

Endoscopic intervention for removal of foreign bodies and food impactions may represent a challenge to the endoscopy nurse and associate. Knowledge of the incidence and understanding the potential complications are important components in planning the care of this patient population. Possession of a working knowledge of the endoscopic accessories and organization of these tools will facilitate a safe

Month_____ Year_____

Foreign Body Kit

Product Bag # 1	Par Level	M	Tu	W	Th	F	M	Tu	W	Th	F
Disposable Overtube	1										
Foreign Body Hood Protector	2										
Reusable Stone Retrieval Basket	1										
Reusable Coin Retrieval Forcep	1										
Reusable Stent Retrieval Forcep	1										
Reusable Tripod Grasping Forcep	1										
Disposable Biopsy Forcep	1										
Disposable Oval Snare	1										
Disposable Large Oval Snare	1										
Disposable Rotatable Snare	1										
Disposable Roth Net	1										
Endoscopic Ligator Kit	1										
Reusable Sprial Basket	1										
Rat-tooth Alligator Jaw Forcep	1										
Alligator Jaw Forcep	1										
Technician Initials	AM.										
Technician Initials	PM.										
Date											

Foreign Body Kit

Product Bag # 2	Par Level	M	Tu	W	Th	F	M	Tu	W	Th	F
Disposable Overtube	1										
Foreign Body Hood Protector	2										
Reusable Stone Retrieval Basket	1										
Reusable Coin Retrieval Forcep	1										
Reusable Stent Retrieval Forcep	1										
Reusable Tripod Grasping Forcep	1										
Disposable Biopsy Forcep	1										
Disposable Oval Snare	1										
Disposable Large Oval Snare	1										
Disposable Rotatable Snare	1										
Disposable Roth Net	1										
Endoscopic Ligator Kit	1										
Reusable Sprial Basket	1										
Rat-tooth Alligator Jaw Forcep	1										
Alligator Jaw Forcep	1										
Technician Initials	AM.										
Technician Initials	PM.										
Date											

Please return this sheet to the Equipment Coordinator at the end of each month.

FIGURE 6. Foreign body kit inventory checklist.

and timely removal of foreign objects and food impactions. ✪

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