

# **Esophageal Foreign Bodies**

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(American Family Physician, vol 44, no 3, 824-831)

An impacted esophageal foreign body is most often an urgent, rather than a life-threatening, medical situation. Pharmacologic or mechanical methods can be used to relieve the impaction, depending on the patient, as well as the location and physical properties of the foreign body. Flexible fiberoptic esophagoscopy is the accepted standard of care for removal of an object that is not smooth, radiopaque, inert or recently impacted. Although controversial, balloon catheter extraction may be an acceptable alternative in selected cases of esophageal impaction. Intravenous glucagon is useful in relieving distal impaction.

The estimated annual incidence of foreign body ingestion in the USA is about 120 per 1 million population, with approximately 1,500 deaths reported each year. Typically, two types of foreign bodies are encountered: true foreign bodies (eg, buttons, coins, pieces of balloon) and food-related foreign bodies.

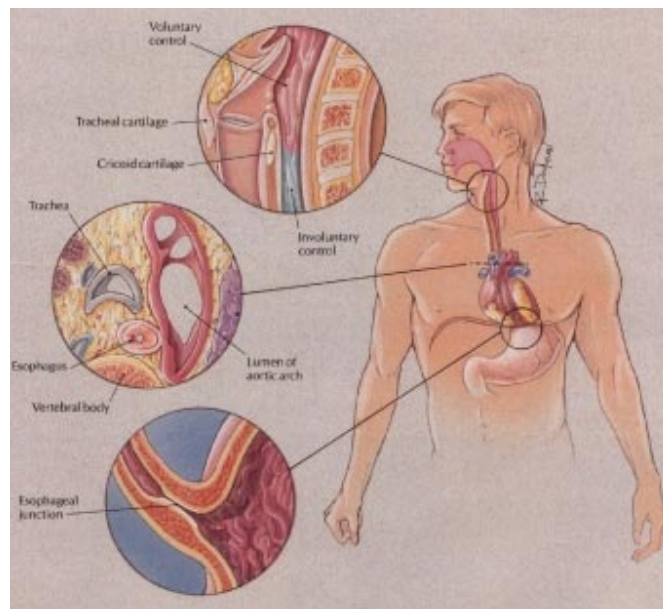
Ingestion of true foreign bodies generally occurs in persons less than 40 years old, with the vast majority being children. The incidence of true foreign body ingestion is also high in incarcerated individuals and in persons with psychiatric disorders. Food-related foreign bodies are more prevalent in persons who are over 60 years of age, who have esophageal disease (anatomic narrowing or motility disorders) or who have recently consumed central nervous system depressants, especially ethanol.

In most cases, an impacted esophageal foreign body is an urgent medical situation, but not a life-threatening one. This article describes the clinical presentations, evaluation and management of esophageal foreign body impaction.

## **Anatomy**

The anatomy of the esophagus is characterized by three areas of physiologic narrowing and, hence, three common areas of obstruction (Figure 1). The proximal third of the esophagus, which terminates below the cricopharyngeal muscle, is composed of striated skeletal muscle under voluntary control, while the distal two-thirds is composed of smooth muscle under involuntary control. Thus, the first area of physiologic narrowing is defined by the junction of striated and smooth muscle, where the propulsive force weakens. Impingement of the aortic arch on the anterolateral wall of the esophagus is the second common area of obstruction. The gastroesophageal junction is the third location; impaction at this site is usually related to the lower esophageal sphincter or to an anatomic lesion.

Most foreign bodies that pass through the esophagus and the pylorus traverse the gastrointestinal tract without difficulty. The appendix, the ileocecal valve and a Meckel's diverticulum are the usual points of obstruction for objects that pass the pylorus.



## **Location, Type and Incidence of Esophageal Foreign Bodies**

Several large retrospective studies have attempted to define the epidemiology, presentation, evaluation and appropriate management of esophageal foreign bodies. In both children and adults, approximately 70 percent of impactions occur in the cervical esophagus, 20 percent in the upper thoracic esophagus and 10 percent in the lower esophagus.

The majority of patients with esophageal foreign bodies are children, and the majority of impactions in children are true foreign bodies. In children, the most common foreign bodies that cause esophageal obstruction are, in decreasing order of frequency, coins, chicken or fish bones, buttons or tacks, marbles or screws, button batteries and straight pins. One series of 128 pediatric patients who had ingested coins demonstrated a correlation between the size of coin ingested and the age of the child. Most pennies were ingested by children under two years of age, the peak incidence of nickel ingestion was at age two years and most quarters were ingested by children three years of age and older. It is possible that in older children, the ingestion of smaller coins is underreported since these coins may pass uneventfully.

In adults, food boluses are the most common impacted objects, followed by bones (particularly fish bones), coins, fruit pits, straight pins and dentures.

The incidence of esophageal foreign bodies appears to be unrelated to sex or race. However, a seasonal variation is evident, with more cases reported in the summer months, especially in children.

## **Clinical Presentation**

Most adults with an esophageal foreign body present with a history of ingestion and symptoms of impaction, such as odynophagia, dysphagia and/or sensation of foreign body. Children, on the other hand, may not present with a clear history of ingestion, and respiratory symptoms frequently predominate over gastrointestinal symptoms. In children, stridor, drooling, refusal to take feedings or a cough aggravated by eating may herald the presence of an occult foreign body; in such cases, a high incidence of suspicion is required to establish the correct diagnosis.

Most patients with food-related foreign body impaction present with symptoms. In contrast, only half of those with true foreign bodies present with acute symptoms suggestive of impaction, perhaps because of the underreporting of symptoms in children, the population in which true foreign body impaction is most common. Symptoms associated with esophageal foreign body impaction are listed in Table 1.

**Table 1. Incidence of Symptoms in Esophageal Foreign Body Impaction**

Symptom	Incidence (%)
Dysphagia	42
Pain	24
Foreign body sensation	21
Regurgitation	21
Salivation	19
Gagging	14
Cough	13
Choking	10
Fever	4

\* Eighteen percent of patients presented without symptoms.

Physical examination may be normal in as many as 90 percent of patients with esophageal impaction. Rare findings on physical examination include fever, pharyngeal erythema, palatal abrasion, wheezing or pulmonary consolidation, and subcutaneous emphysema suggestive of esophageal perforation.

## Evaluation

The evaluation of esophageal foreign body impaction is usually quite routine. A thorough history is the most valuable diagnostic tool. Frequently, patients will recall the type of foreign body ingested and the interval since ingestion. Patients also should be questioned about the symptoms listed in Table 1. In children, particular attention should be given to respiratory symptoms. The most critical presenting symptom will help determine the best approach to management.

Although no physical findings are present in the majority of patients with esophageal foreign body impaction, examination of the pharynx, neck, trachea, lungs and abdomen should be performed. Laboratory evaluation, in preparation for possible surgery, may be prudent in patients with signs or symptoms suggestive of respiratory compromise. Otherwise, laboratory evaluation usually is not necessary.

After the history has been taken and the physical examination has been performed, radiographs should be obtained. If pharyngeal impaction is suspected, anteroposterior and lateral neck radiographs taken at a soft tissue density may be helpful. If impaction distal to the pharynx is suspected, anteroposterior and lateral chest radiographs can be useful. If a radiolucent foreign body is suspected, swallowing studies with contrast medium should be performed (Figure 2).

In many cases, the orientation of a foreign body, as seen on radiographs, can provide valuable information for determining the precise location of the object (Figure 3). Because of the cartilaginous support of the trachea, tracheal foreign bodies tend to orient in the anteroposterior direction, while esophageal foreign bodies usually orient in the frontal plane.

Recently, the routine use of radiography in asymptomatic children with coin ingestions has been questioned, although most authorities still consider radiographs to be helpful in management. After full definition of the location of a foreign body and evaluation for associated injuries, a treatment plan may be formulated.

## Management

Initial management of patients with esophageal foreign bodies is directed toward life-threatening complications, particularly airway obstruction. Because of the proximity of the esophagus to the trachea, even small amounts of soft tissue swelling from an esophageal impaction can have significant effects. The usual techniques of airway management should be employed; only rarely is cricothyrotomy or tracheostomy required. After initial stabilization, various pharmacologic and mechanical interventions can be used, depending on the type and size of the

foreign body, as well as the location and duration of the impaction.

### **Pharmacologic Therapy**

Several pharmacologic methods of relieving esophageal obstruction have been described. For meat boluses impacted less than 24 hours and known to contain no bones or bone fragments, enzymatic digestion with papain may be tried, although this method has recently fallen into disfavor. A solution of one-fourth teaspoon of papain in 30 mL of water is instilled through a soft catheter placed immediately above the obstruction. Papain does not affect intact esophageal mucosa, but the risk of perforation and mediastinitis is increased when mucosal injury is present. Furthermore, if enzymatic digestion fails, subsequent instrumentation carries a higher risk of complications.

The use of gas-forming agents to propel food bolus impaction in the distal esophagus into the stomach has been described. Using a recent modification of this technique, 75 percent of these impactions can be alleviated by the administration of 1 mg of glucagon intravenously, immediately followed by administration of one packet of E-Z gas (sodium bicarbonate, citric acid and simethicone) dissolved in 30 mL of water and an additional 240 mL of water.

Various sedative agents, including diazepam (Valium) and meperidine (Demerol), have also been studied, with success rates ranging from zero to about 8 percent. The sedative effect of these drugs increases the risk of aspiration. Administration of anticholinergic drugs such as atropine may produce smooth muscle relaxation and lead to passage of the foreign body. However, anticholinergic agents appear to be effective in only about 3 percent of cases, and the risk of gastric outlet obstruction is increased with their use.

The current pharmacologic agent of choice for distal esophageal impaction is glucagon, which is effective in 30 to 50 percent of patients. Since glucagon relaxes only smooth muscle, it is ineffective in the cervical esophagus. The usual adult dose of glucagon is 0.5 to 2.0 mg administered intravenously after a small test dose; the pediatric dose is 0.05 mg per kg. After glucagon is administered, the patients should drink several sips of water. The initial dose may be repeated in 10 to 20 minutes, if needed. The most commonly reported side effects of glucagon are nausea, vomiting and dizziness. The only contraindications to its use are the presence of an insulinoma, a pheochromocytoma or Zollinger-Ellison syndrome.

If pharmacologic methods fail to relieve esophageal obstruction, mechanical manipulation is required.

## **Flexible Fiberoptic Esophagoscopy**

Before flexible fiberoptic instruments were developed, rigid esophagoscopy was the definitive method for esophageal foreign body retrieval. Currently, most experts consider flexible fiberoptic esophagoscopy to be the only acceptable intervention for objects that require mechanical removal. These include objects that have been impacted for more than a few hours, sharp objects, button batteries and objects that are not smooth or inert. Flexible fiberoptic esophagoscopy is also indicated when a complication is anticipated. The procedure is costly, usually requires general anesthesia and must be performed by a skilled endoscopist.

Esophagoscopy is relatively safe. The reported perforation rate is 0.25 percent, and the majority of complications appear to be related to endotracheal intubation or preexisting respiratory illness. Advantages of esophagoscopy include direct visualization of the offending object, definitive airway control and the ability to evaluate for associated esophageal injuries. For retrieval of sharp objects and those impacted for more than 24 to 48 hours, esophagoscopy is the only alternative to operative intervention.

## **Balloon Catheter Extraction**

In selected cases, mechanical removal of an esophageal foreign body may be accomplished using a balloon-tipped catheter. Contraindications to this procedure include acute distress in a patient, complete obstruction, impaction for more than 24 hours (two hours for button batteries), unknown foreign body, known esophageal disease and impaction of an object that is not inert or smooth.

Retrospective studies indicate that balloon catheter extraction has a success rate of about 85 percent. Minor reported complications include emesis, epistaxis (with nasal catheter placement), bradycardia and superficial oropharyngeal trauma. Theoretic complications include esophageal perforation and aspiration of the foreign body during removal, although these problems have not been reported.

In a recent survey of pediatric radiologists, nearly 50 percent of the respondents reported regular use of balloon catheter extraction. In more than 2500 cases, the only potentially serious complication was reversible hypoxia in a child with transposition of the great vessels. An overall complication rate of 0.4 percent was reported, with no residual sequelae. No prospective studies comparing flexible fiberoptic esophagoscopy with balloon catheter removal have been reported.

The technique for Foley catheter extraction of an esophageal foreign body is fairly simple, but a cooperative or mildly

sedated patient is required. Cardiac monitoring and continuous oximetry are usually recommended. It is also recommended that resuscitation equipment and a fluoroscopy unit be immediately available, although some experts do not feel that fluoroscopy is essential.

With the patient in a sitting position, a Foley catheter, 10 to 16 F in size, is passed orally. The patient is then placed in a prone lateral Trendelenburg position to reduce the risk of tracheal or nasopharyngeal obstruction during foreign body removal. The balloon is filled with a water-soluble contrast medium, and the catheter is withdrawn with steady, slow traction, making certain there is no hesitation when the hypopharynx is encountered. When the foreign body reaches the pharynx, it may be retrieved with forceps or expelled with a forceful cough. If the first pass of the catheter is unsuccessful, the procedure may be repeated once, but multiple attempts are not recommended.

If Foley catheter extraction is successful and uncomplicated, the patient may be discharged, but a follow-up examination about one week later is suggested. The patient should be given instructions to return immediately if symptoms such as fever, dysphagia, bloody saliva, respiratory difficulty, abdominal pain, chest pain or melena occur.

### **Button Battery Impaction**

A special situation arises when the ingested foreign body is a button battery. As with most foreign bodies of the gastrointestinal tract, button batteries that pass into the stomach usually traverse the gastrointestinal tract uneventfully. When esophageal impaction occurs, however, localized current production leads to rapid esophageal erosion.

Guidelines on the use of pharmacologic agents for the treatment of button batteries impaction do not exist at this time. Button batteries lodged in the esophagus should be removed endoscopically if equipment and trained personnel are available. Balloon catheter extraction is an acceptable alternative if endoscopy is unavailable and the impaction is of less than two hours' duration.