

Foreign Bodies in the Gastrointestinal Tract and Anorectal Emergencies

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KEYWORDS

- Foreign bodies • Gastrointestinal tract • Endoscopic surgery
- Anorectal emergency

FOREIGN BODIES IN THE GASTROINTESTINAL TRACT

In the United States, 1500 people die each year due to ingested foreign bodies (FBs).¹ Eighty percent of FB ingestions occur in young children who swallow small objects such as coins, toys, crayons, and ballpoint pen caps.^{2,3} Accidental FBs in adults tend to be caused by meat and bones. The remaining cases are found primarily among edentulous adults, prisoners, and psychiatric patients, who often intentionally ingest objects such as toothbrushes, spoons, and razor blades; and who are also more likely to recurrently ingest FBs.⁴⁻⁸ Wearing dentures is a significant risk factor in FB ingestion.^{9,10} Dentures eliminate the tactile sensitivity of the palate so that small objects or incompletely masticated food boluses are inadvertently swallowed. Of the FBs brought to the attention of physicians (probably a small minority of all ingestions), 80% to 90% will pass through the gastrointestinal (GI) tract spontaneously; however, 10% to 20% will require endoscopic removal, and about 1% will require surgery.^{11,12}

The GI tract can be divided into several regions in which presentation, clinical findings, and management of FBs is distinct. These regions include the oropharynx, esophagus, stomach and duodenum, small and large intestine, and rectum. In this article the relevant anatomy, clinical features, and management strategies for impacted FBs in each of these regions are discussed.

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OROPHARYNGEAL FOREIGN BODIES

Most ingested FBs do not become impacted in the oropharynx. The most common exceptions are fish or chicken bones (**Fig. 1**), although any sharp or irregular object may become impacted.^{13–16} These objects most often lodge in the soft tissue at the base of the tongue, but may also be found in other areas such as the tonsil or piriform sinus.¹³ Minor lacerations and abrasions are common and self-limited. If the patient is drooling or is unable to tolerate oral intake of liquids, the clinician should be concerned about complete obstruction. Rarely, patients may also present with airway compromise. An unremoved FB may serve as a nidus for infection such as a retropharyngeal abscess, usually weeks later.¹⁷

Patients usually know exactly when the object became impacted. Typically they present to the Emergency Department (ED) with a FB sensation and odynophagia several hours after ingestion, and they may have attempted one or more home remedies such as drinking fluid, eating bread, or trying to grasp the object with their own fingers. Due to the sensory innervation by the vagus and glossopharyngeal nerves, patients are able to accurately lateralize and determine the level of a FB in this region (**Fig. 2**).¹⁸ With larger objects the patient may also be drooling, retching, or vomiting.

Management of an oropharyngeal FB begins with an attempt at direct visualization. If this is possible, the FB can usually be removed using forceps or a hemostat. However, most FBs will have passed beyond the level of direct visualization and will require indirect laryngoscopy or fiberoptic nasopharyngoscopy. If an FB is identified, yet attempts at removal are unsuccessful, an ear/nose/throat consultation should be made.

More commonly, no FB can be identified. Indeed, less than 25% of patients with FB sensation after eating fish or chicken actually have an FB located by endoscopy.^{19–21} Despite this low rate, endoscopy within 24 hours rather than imaging studies is the next logical step, because radiography alters management extremely rarely (in only 1.5% [4 of 267] in one series).^{5,16,20,22,23}

If imaging modalities are indicated because of the ingestion of a radiopaque object, plain films are usually the first step.^{13,16,24–26} Most radiopaque objects such as metal

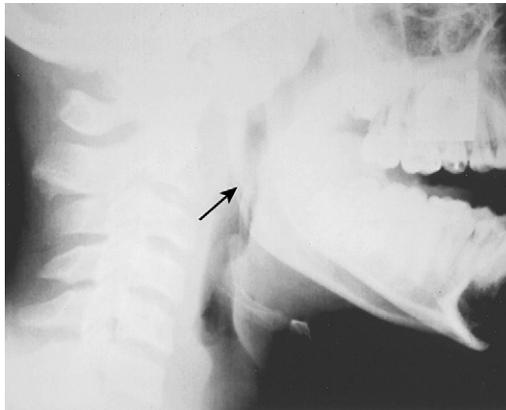


Fig. 1. A lateral neck radiograph demonstrating a chicken bone lodged in the pharynx with associated soft tissue swelling. The arrow identifies the bone. Plain radiography has poor diagnostic accuracy in identifying bones in the pharynx and esophagus. (From Munter DW. Esophageal foreign bodies. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 5th ed. Philadelphia: Elsevier, 2010; with permission.)



Fig. 2. Due to the innervation of the oropharynx and proximal esophagus, patients are able to correctly localize foreign bodies when they become lodged in these proximal areas of the GI tract. (From Munter DW. Esophageal foreign bodies. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 5th ed. Philadelphia: Elsevier, 2010; with permission.)

or glass should be visible. The visibility of fish bone depends on the fish species, location, and orientation; however, the majority are not seen on plain films, with much higher success in the hypopharynx than oropharynx.^{13,19,25,27}

If plain films do not successfully locate an FB, an esophagogram with diluted barium or gastrografin can be performed in an attempt to outline the object.^{22,23,28} Further radiographs with barium-impregnated cotton balls and xeroradiography may be useful.^{5,23,29} Finally, computed tomography (CT) may identify fish or chicken bones missed on plain film.^{13,19,30,31}

With the limited availability of prompt endoscopy at many times and in many EDs, there is likely to be a continued role for imaging studies in the initial assessment of these patients, even though most patients who present with an FB sensation will have no definitive findings at the conclusion of an extensive radiologic workup. At this point, because lacerations and abrasions may also cause an FB sensation and most serious complications are delayed, patients with a negative evaluation may be discharged home with strict return instructions and referral for endoscopy.⁵

ESOPHAGEAL FOREIGN BODIES

Overview

The esophagus is a common site for impaction of FBs that are accidentally or purposefully swallowed. Most patients will present with minor irritation and an FB sensation, others will have more severe symptoms, and rarely the impacted FB may result in a life-threatening airway obstruction. The mucosa of the esophagus does not tolerate retained FBs well. Over time edema, necrosis, then infection or perforation

occur. Some retained FBs may become less symptomatic over time; however, retained esophageal FBs should be removed expeditiously, as prolonged impaction frequently results in severe complications. With the exception of distal esophageal coins (see later discussion), allowing entrapped foreign objects to pass spontaneously or dissolve in minimally symptomatic patients is not recommended.

Anatomy

The esophagus is a muscular tube that is continuous with the hypopharynx proximally and extends 18 to 25 cm distally to the gastroesophageal junction. It is divided anatomically into thirds: the proximal third consists of striated (voluntary) muscle, the distal third consists of smooth (involuntary) muscle, and the middle third is a mixture of the two. The proximal third has both somatic motor and sensory innervation through branches of the recurrent laryngeal nerve, similar to the oropharynx, which allows patients to localize proximal FBs accurately (see **Fig. 2**).¹⁸

There are 3 areas of physiologic narrowing along the adult esophagus where blunt FBs most commonly become impacted (**Fig. 3**). The first area is located posterior to the cricoid cartilage, at the level of the C-6 vertebra, where the esophagus begins with the upper esophageal “sphincter” (UES) or cricopharyngeus muscle. The UES is the most common site of impaction in pediatric patients (**Fig. 4**).^{3,4,32} The second is at the level of T-4 where the distal aortic arch descends posterior to the mid-esophagus. Distally there is also an area of narrowing at the lower esophageal sphincter (LES). The LES is the narrowest point of the entire gastrointestinal tract in adults, and it is the location where most FBs become impacted (**Fig. 5**).^{4,32} Patients with an anatomic abnormality or motor disturbance of the esophagus are more prone to entrapment of food or other objects, and will usually present with a history of chronic swallowing problems. Anatomic abnormalities include strictures, webs, rings, diverticula, and malignancies.^{6,7} Motor disturbances are much rarer and include achalasia, scleroderma, diffuse esophageal spasm, or nutcracker esophagus.^{6,7}

Epidemiology

Patients with retained esophageal FBs usually fall into 1 of 4 groups: pediatric, intentional adult ingestions, denture users, and adults with underlying esophageal

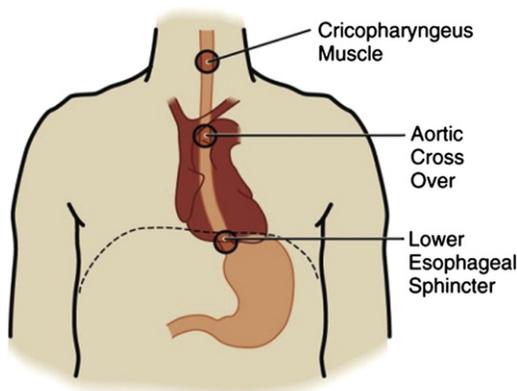


Fig. 3. The 3 anatomic areas of narrowing where esophageal FBs most commonly become impacted: the cricopharyngeus muscle, the aortic crossover, and the lower esophageal sphincter. (From Munter DW. Esophageal foreign bodies. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 5th ed. Philadelphia: Elsevier, 2010; with permission.)

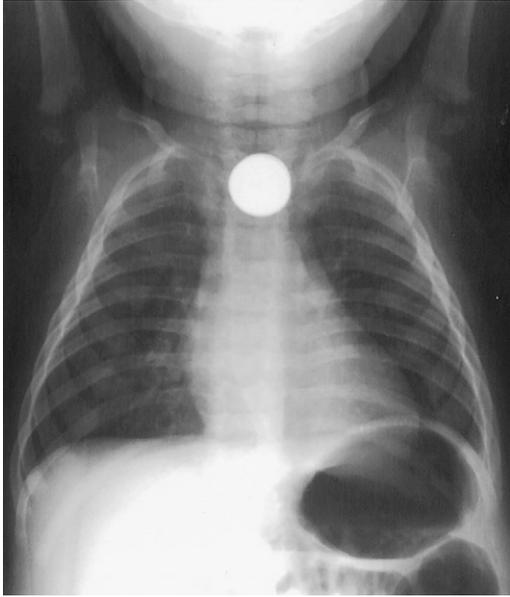


Fig. 4. Posteroanterior radiograph of an impacted esophageal coin at the level of the cricopharyngeus muscle. This is the most common area of esophageal FB impaction in children. (From Munter DW. Esophageal foreign bodies. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 5th ed. Philadelphia: Elsevier, 2010; with permission.)

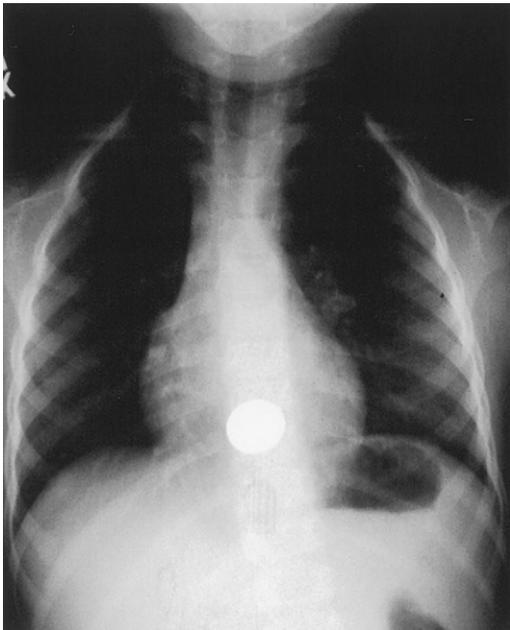


Fig. 5. Posteroanterior radiograph of an impacted esophageal coin at the level of the lower esophageal sphincter. This is the most common area of esophageal FB impaction in adults. (From Munter DW. Esophageal foreign bodies. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 5th ed. Philadelphia: Elsevier, 2010; with permission.)

pathology. Pediatric patients account for approximately 80% of retained esophageal FBs, with the peak incidence at 18 to 48 months.^{11,22,23,33–39} These small children habitually place objects in their mouths and can inadvertently swallow or aspirate them. The most commonly ingested objects in this age group are coins,^{5,6,36,40,41} but other small objects such as buttons and marbles are also commonly ingested.^{5,11,33,36,42} Unusual or multiple FBs should alert the examining clinician to possible child abuse.⁴³ Patients with esophageal dysmotility are prone to impaction from even relatively small pieces of swallowed food.^{5–7,42}

Complications

Many complications may arise from esophageal FBs, ranging from superficial mucosal injury to vocal cord paralysis, perforation, and life-threatening conditions such as retropharyngeal abscess and vascular injuries such as aortoesophageal fistula.^{44–50} Complications are more likely with FBs that have been impacted for more than 24 hours and with sharp objects.^{5,33} Most mortality from ingested FBs occurs because of complications from esophageal perforation.^{1,23}

Presentation

Patients with an impacted esophageal FB usually present shortly after ingesting the object, and most adults and older children are able to provide a clear history of ingestion. The object is easily localized by the patient when it is located at the UES and upper third of the esophagus; however, when the object is located lower in the esophagus the patient may only have vague symptoms such as dysphagia, odynophagia, or a dull FB sensation that is not easily localizable. FBs at the UES may also cause gagging or vomiting.⁴² Drooling or the inability to handle secretions suggests complete esophageal obstruction.⁶

Patients in the 18- to 48-month-old age group, which has the highest incidence of FB ingestion, may present with carers who are unable to provide a history of FB ingestion. A high index of suspicion is required, and clinicians should inquire about an object that was in the patient's mouth that "disappeared" or a transient history of coughing or gagging. An estimated 40% of FB ingestions in children are unwitnessed, and up to 50% never develop symptoms.^{51–56} Symptoms are nonspecific and include irritability, poor feeding, vomiting, coughing, wheezing, behavioral changes, and failure to thrive.^{6,14,51,57–59} Children are more likely than adults to have respiratory symptoms from an impacted esophageal FB, as their airway is softer and more compressible. Additional respiratory symptoms may include stridor, airway obstruction, and cardiac arrest.

Evaluation

When evaluating for an esophageal FB, the physical examination is usually normal.^{6,7} As noted, drooling suggests complete obstruction.⁶ Subcutaneous emphysema in the cervical region suggests esophageal perforation. Airway symptoms should be sought in children due to their softer and more compliant trachea.³²

Because many patients are asymptomatic, and physical examination is usually normal, there should be a low threshold for obtaining plain radiographs.⁵ Plain films usually detect radiopaque FBs such as glass and metal, but most ingested objects (food bolus, toothpick, aluminum beverage pull-tab, and many fish and chicken bones) are missed by plain films.^{20,21,25,26,30,60} Because FBs preferentially become lodged at the UES in children and at the LES in adults, they will appear posterior to the tracheal air column on lateral view in children and beyond it in adults. Flat FBs are typically found to be lying in the frontal plane (see **Figs. 4** and **5**).⁶¹

For most patients with a food bolus impaction a plain film prior to propulsive therapy is prudent, as it may identify identification of a sharp fragments or other unanticipated disease in the thorax. If the diagnosis is in doubt, a contrast esophagogram may be obtained, although this decision is likely to make esophagoscopy much more difficult if it is required and is not without risk of aspiration, especially with high-grade obstructions.^{60,62,63} Esophagograms are also limited by high reported false-positive (19%–26%) and false-negative (40%–55%) rates.^{21,64} Barium is preferred to gastrografin unless there is risk of esophageal perforation, because it is much less toxic if aspirated. Newer nonionic solutions have been shown to be safe in either situation, but they are costly and may not be widely available.^{7,42} Consultation with an endoscopist, if available, is prudent before performing a contrast swallowing study.

An increasingly widely available alternative to both esophagograms and esophagoscopy is noncontrast CT of the neck and mediastinum (**Fig. 6**).^{19,62,65} In one study, CT found all impacted bony FBs located by endoscopy. In this study there was one false positive caused by esophageal calcification, and no false negatives.³⁰ Another study also demonstrated 100% sensitivity of CT for localizing esophageal FBs as well as demonstrating that CT may provide the additional benefit of identifying complications, including an esophageal perforation that was not seen with barium swallow.³¹ A different study demonstrated this same benefit by locating an aortoesophageal fistula 7 days after the ingestion of a bone splinter.⁶⁶

Management

The management strategy for esophageal FBs depends on their nature, location, and duration of impaction. As a general rule esophageal FBs are either urgently removed or seen to have passed into the stomach prior to patient discharge.

Esophagoscopy

Esophagoscopy is the best available technique for retrieval of most esophageal FBs, and allows for evaluation of secondary injury.^{23,39} In many EDs the availability of esophagoscopy is limited, in which case other techniques described in this article may be needed. Clinical indications for immediate esophagoscopy include airway



Fig. 6. Computed tomography demonstrates the presence of an esophageal FB (arrow). (From Munter DW. Esophageal foreign bodies. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 5th ed. Philadelphia: Elsevier, 2010; with permission.)

compromise (including stridor, coughing, or wheezing), evidence of obstruction or any FB that has been impacted for more than 24 hours, or if signs of perforation are present.^{5,39,40,67} Sharp or elongated FBs should be removed endoscopically, as there is a high risk of perforation (**Fig. 7**). Button batteries that cannot be passed into the stomach with swallowed water require immediate endoscopic removal. Patients with signs of obstruction should be encouraged to sit in whatever position is most comfortable for them (upright in most cases) and should be allowed to suction their own secretions. For obtunded or gagging patients, placement of a nasogastric tube in the esophagus above the obstruction may succeed in draining pooled secretions.

If esophagoscopy is not immediately available, the patient should be transferred to a facility where an experienced endoscopist is on hand. The success rate for the endoscopic removal of a sharp object is between 94% and 100%.^{23,39,68} Endoscopy should be performed under procedural sedation to prevent patient movements that may result in perforation or loss of the object into the patient's airway. Failed endoscopic removal will require removal in the operating room.

Button batteries

Button batteries contain an alkaline solution that can rapidly cause liquefaction necrosis of the esophageal mucosa (**Fig. 8**). Perforation may occur within 4 hours, with catastrophic complications such as esophagotracheal or esophagoaortic fistula.^{49,69} If a child can cooperate, an attempt should be made to pass the battery into the stomach with swallowed water. Endoscopic removal of a button battery is challenging because of their smooth edges, and a collective review demonstrated that endoscopic removal failed 62.5% of the time.⁷⁰ When removal fails, the battery can be pushed distally to the stomach where it will likely pass through the gastrointestinal tract without difficulty.⁷⁰⁻⁷³ Management of button batteries in the stomach is



Fig. 7. Posteroanterior radiograph of an open safety pin in the proximal esophagus. Sharp FBs lodged in the esophagus should be removed endoscopically. (From Munter DW. Esophageal foreign bodies. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 5th ed. Philadelphia: Elsevier, 2010; with permission.)

described in the section “Stomach and duodenal foreign bodies.” Follow-up with barium swallow studies to evaluate for a fistula or stricture is usually recommended at 24 to 36 hours and 10 to 14 days after the battery has been removed from the esophagus.²³ Antibiotics are recommended when significant mucosal damage is present.

Coins

As with other esophageal FBs, coins tend to lodge at the level of the cricopharyngeus in children and the LES in adults (see **Figs. 4** and **5**).²³ In young adults, accidental coin ingestion has become more common, due to a popular college drinking game called “Quarters.”⁵ Because coins in either the GI tract or the airway may cause similar symptoms, plain radiographs should be taken to determine the location of the coin.^{74–77} Mouth to anus films are indicated in the pediatric population to determine if more than one FB is present.⁵

Coins lodged in the proximal or mid esophagus should undergo prompt extraction to avoid complications that are correlated with impaction times of longer than 24 hours.^{33,78–80} Although some authorities state that an asymptomatic patient with a coin in the distal esophagus may be given 12 to 24 hours to allow the coin to pass into the stomach, this approach may not be practical in settings with limited and unreliable follow-up.^{34–36,81,82} In most cases, impacted esophageal coins should be removed expeditiously, usually by endoscopy or, in children, by bougienage.^{5,68,81} The catheter technique for removal of esophageal coins and other foreign objects was widely practiced in the era prior to the wide availability of endoscopy (**Fig. 9**). Many complications can ensue, including esophageal perforation, laceration, regurgitation with or without aspiration, and airway obstruction. These risks are compounded by most emergency physicians’ lack of experience or familiarity with this techniques and the fact that more than 24 hours’ impaction, one of the indications for intervention, is itself a contraindication to Foley extraction. The technique may still be useful in remote or austere settings where endoscopy is not available. If it is undertaken, all precautions should be taken to protect the airway. The Foley catheter should be placed orally rather than nasally to ensure that the coin is not pulled into the nasopharynx, and the patient should be placed in deep Trendelenburg to minimize the risk of aspiration. Fluoroscopy may make this procedure safer.^{83,84}

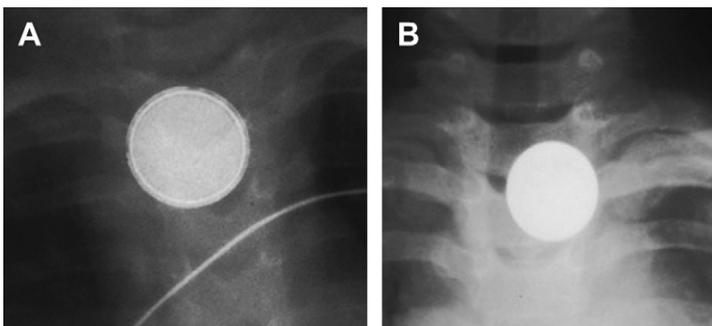


Fig. 8. (A, B) Two examples of button batteries lodged in the proximal esophagus. The appearance of button batteries on plain radiographs may mimic that of coins. Button batteries may cause liquefaction necrosis and perforation of the esophageal wall within 4 hours, and expedited removal should be arranged. (From Munter DW. Esophageal foreign bodies. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 5th ed. Philadelphia: Elsevier, 2010; with permission.)

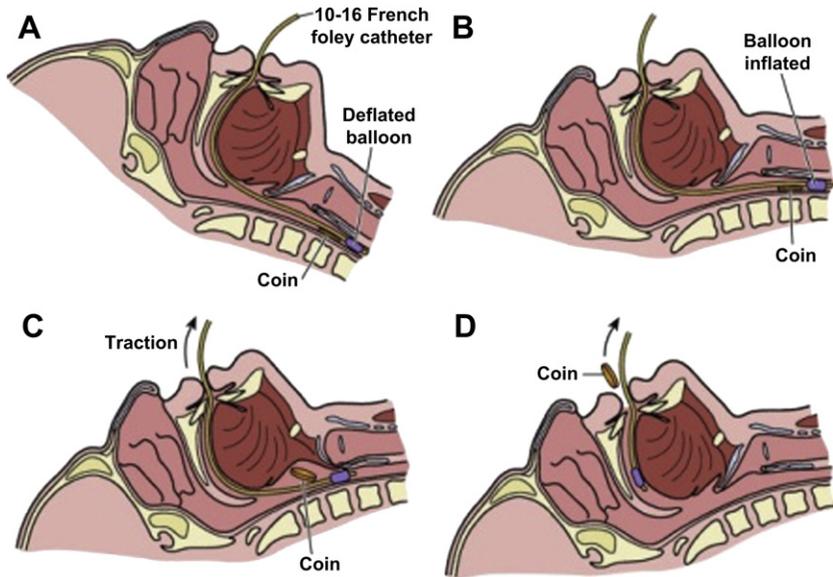


Fig. 9. (A–D) Technique for Foley catheter extraction of esophageal FBs. (A) The catheter is inserted orally into the esophagus distal to the coin. (B) The balloon is inflated. Gentle traction moves the coin proximally. (C) The coin is moved past the glottis. (D) The coin is brought into the mouth and grasped by the operator. This procedure has many complications and should only be performed where endoscopy is not available. Fluoroscopy may make the procedure safer. (From Munter DW. Esophageal foreign bodies. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 5th ed. Philadelphia: Elsevier, 2010; with permission.)

Bougienage, which has been successfully used to dislodge impacted esophageal coins in children, attempts to blindly advance the coin into the stomach. This technique has been used effectively by emergency physicians in pediatric patients, with a greater than 95% success rate and few reported complications, and results in significant reductions in ED length of stay and costs.^{38,85–88} However, the technique requires equipment that is not available in many EDs (a Hurst-type bougie in a variety of sizes), and has been reported in settings where the emergency physicians have received special training in centers that have developed extensive experience in the technique. Postprocedure films should be obtained to document coin location. Patients may be discharged home with instructions to obtain follow-up radiographs if the coin is not noted in the stool within a week. All adults should obtain follow-up to evaluate for an underlying esophageal disorder.⁵

Pharmacologic therapies

FBs that pass the LES are usually able to pass along the remainder of the GI tract without complication. Several pharmacologic therapies have been developed to aid a blunt or smooth FB at the LES to pass into the stomach. Some of these such as atropine, meperidine, and diazepam have been shown to have success rates lower than observation alone.^{33,42} Papain was used in the past to dissolve impacted meat,⁸⁹ but this practice has been abandoned because it can also dissolve the esophageal mucosa, resulting in esophageal rupture.^{90,91} Glucagon, nitroglycerin, nifedipine, and gas-forming agents have proved to be the most effective pharmacologic agents in the management of distal blunt esophageal FB impactions, and are discussed individually here. Anxiolysis and pain control are also an important aspect of FB

management, and may account for some of the success of the other pharmacologic agents discussed.⁹²

Glucagon

The action of glucagon is thought to result from relaxation of the smooth muscle found in the distal esophagus and a decrease in the LES resting pressure.⁹³ Glucagon has no effect on the striated muscle of the proximal esophagus, where children often have impacted FBs. The therapeutic dose is 0.25 to 2.0 mg administered intravenously.

A common side effect of glucagon, if administered too rapidly, is nausea and vomiting. This effect may be responsible for some of the drug's success in clearing obstruction⁹⁴; however, there is a theoretical risk of rupture of an obstructed esophagus with vomiting, so slow injection over 1 to 2 minutes is recommended. Mild elevation of blood glucose may also occur, but blood glucose does not need to be monitored.

The onset of action is less than a minute and the effects last about 25 minutes. After administration, the patient should be sitting upright and should be encouraged to take a sip of water approximately 1 minute after injection to induce esophageal peristalsis. A second dose may be used if the first is not successful. Glucagon is often thought of as a first-line agent. Its success rate of less than 38% can be improved when combined with gas-forming agents or carbonated beverages.^{95–97}

Nitroglycerin and nifedipine

Sublingual nitroglycerin and nifedipine have been used in a manner analogous to that of glucagon for the disimpaction of distal blunt esophageal FBs.^{98–100} Nitroglycerin reduces distal esophageal spasm and contraction, and nifedipine relaxes the LES in a manner similar to glucagon. Either may be used in combination with glucagon, but nitroglycerin and nifedipine should not be used simultaneously. The therapeutic dose is 1 to 2 (0.4 µg) sublingual nitroglycerin tablets or 5 to 10 mg of nifedipine. Patients with impacted esophageal FBs may be dehydrated because of an inability to swallow, and may be extremely sensitive to these agents, placing them at risk of iatrogenic hypotension. Intravenous access with a widely patent line sufficient for volume resuscitation should be placed, and the patient adequately hydrated before administration of these medications.

Gas-forming agents

Gas-forming agents and carbonated beverages have been used successfully for the treatment of distal esophageal food impactions. These solutions produce carbon dioxide, which is thought to distend the esophagus, relaxing the LES, and pushing the FB distally into the stomach.^{96,101,102} Their use may increase the success of other spasmolytic agents.^{101,103} Solutions described in the literature include a combination of 15 mL tartaric acid (solution of 18.7 g/100 mL water) followed immediately by 15 mL of sodium bicarbonate (10 g/100 mL water) or 1.5 to 3 g of tartaric acid dissolved in 15 mL of water followed by 2 to 3 g of sodium bicarbonate in 15 mL of water.^{96,101} Commercially available gas-forming granules have also been used successfully.¹⁰⁴ Carbonated beverages (100 mL) may also work, and are more likely to be readily available in the ED.^{97,102} Gas-forming agents should not be used if the FB has been impacted for more than 6 hours; if the patient is complaining of chest pain suggestive of esophageal injury; or if there is concern for obstruction, as there have been rare reports of esophageal perforation.^{96,101,105}

If the patient has improvement of symptoms after pharmacologic intervention, a postprocedure radiograph or contrast study may be obtained to confirm passage into the stomach. Adult patients may be discharged home after successful

disimpaction of an esophageal FB, but they should have close follow-up, as the majority will have an underlying esophageal disorder.²³ Patients who have had an esophageal FB dislodged by any method should be instructed to return to the ED with any chest or abdominal pain, persistent vomiting, hematemesis, difficulty swallowing, or shortness of breath.⁹⁶

STOMACH AND DUODENAL FOREIGN BODIES

The vast majority of FBs that enter the stomach pass through the entire GI tract uneventfully. Objects longer than 5 cm may have difficulty negotiating the tight curve of the duodenum, and objects larger than 2 cm in diameter may have difficulty passing the pylorus or ileocecal valve.^{106,107} Less than 1% of FBs that enter the stomach cause perforation of the bowel¹⁰⁸; however, some investigators describe an intestinal perforation rate of 35% with sharp objects (usually at the ileocecal valve) whereas others, especially in the pre-endoscopic era, reported much lower rates.^{78,109}

Most patients with an FB in the stomach are asymptomatic on presentation. Symptoms from an FB in the stomach may include pain, nausea, vomiting, hematemesis, or fever, and usually are secondary to a complication such as bleeding, obstruction, or perforation. Infants may present with failure to thrive. In young children, the symptoms that the patient is experiencing may be the first suggestion that an FB was ingested if the parents did not witness the event. Because the most common management of blunt FBs in the stomach is serial plain films over a period of weeks, a patient with a known FB may return to the ED with new symptoms or with asymptomatic failure of the object to pass.

Management of the patient with an FB in the stomach or duodenum varies depending on the nature of the FB and the patient's symptoms. Emergent endoscopy is a high priority if objects are long (>5 cm), of large diameter (>2 cm), or sharp, especially needles or toothpicks.^{5,40,67,110} Small blunt objects can be observed and followed with serial radiographs.⁶ If an object remains in the stomach for more than 7 days, the patient should be referred to a gastroenterologist for removal. If a patient becomes symptomatic, the object should be removed. Button batteries and drug packets require special attention and are discussed further.

Button Batteries in the Stomach

Button batteries should be followed with daily radiographs. Up to 85% will pass through the entire GI tract within 72 hours.^{69,81} A button battery should be removed endoscopically if it remains in the stomach for more than 36 to 48 hours or if the patient becomes symptomatic. H₂ blockers have been suggested to decrease the stomach acid reaction with the battery, but no benefit from this therapy has been confirmed.⁶⁹ Once past the duodenum, FB are no longer endoscopically accessible. Radiographs are needed only every 3 to 4 days to document progression if the FB has not been identified in the stool. A button battery that fails to pass or becomes symptomatic must be removed surgically. Although extremely rare, toxic serum concentrations of mercury have been reported, especially if the integrity of the battery (as determined by history or radiograph) has been disrupted, and may require chelation therapy.^{69,111-113}

Illicit Drug Ingestion

Drug packets are ingested intentionally by "drug packers" and "drug stuffers." The preparation and quantity of drug ingested by these 2 groups typically have characteristic differences.^{114,115} Drug packers are usually smugglers who ingest large quantities

of drugs that have been carefully packaged to withstand transit through the GI tract.¹¹⁶ Condoms and toy balloons wrapped in multiple layers have been the packaging material used most frequently; however, more precisely crafted wrappers have been reported in recent years.^{111,116–118} Cocaine and heroin are the most commonly packed drugs, although other drugs are smuggled using this method as well.¹¹⁹ Body packers may carry up to 1 kg of drug divided into 50 to 100 individual packets, although more than 200 packets have been reported.^{119–121} Each packet contains a lethal dose of drug.^{116,119,122,123} Drug stuffers are typically drug dealers or users who quickly ingest drug that has been loosely wrapped in plastic, foil, or poorly sealed containers while being pursued by law enforcement officials. Although the quantity of drug ingested by drug stuffers is typically much less than that of drug packers, the packaging is more likely to leak and cause symptoms. On rare occasion, the amount of drug ingested by a drug stuffer may be a lethal dose.

Both body packers and stuffers may present to the ED with a toxicologic emergency or under the custody of law enforcement officials wanting medical assessment of the patient and possible drug retrieval for evidence. Body packers may also present with bowel obstruction. “Body packer syndrome” should be considered in any recent international traveler who presents to the ED with seizures or a toxidrome consistent with illicit drug overdose.¹²³ Patient history is often unreliable, but should focus on the type and quantity of drug ingested as well as the nature of the packaging. History and physical examination findings to suggest a toxidrome should be sought. Evaluation should include plain radiography, which will demonstrate 85% to 90% of ingested drug packets but is less likely to identify small numbers of drug packets.^{111,116,119} CT or barium-enhanced radiography may be used when plain films are not diagnostic.^{124,125} A drug toxicology screen may be helpful in identifying the substance ingested if the patient is symptomatic. In asymptomatic patients, testing has low sensitivity, and positive tests may be unrelated to the packed substance.¹²⁶

Body packers and stuffers who present with a toxicologic emergency should be treated accordingly. All drug stuffers should immediately be placed on continuous cardiac monitoring with large-bore intravenous access. Any sign of cocaine toxicity requires emergent transport of the patient to the operating room.¹¹⁹ Intravenous benzodiazepines should be used liberally to control sympathomimetic symptoms, hypertension, or seizures. Hypertonic sodium bicarbonate and lidocaine may be used for ventricular dysrhythmias, and phentolamine or sodium nitroprusside may be used for hypertension. A more detailed discussion of the management of cocaine toxicity can be found elsewhere, and consultation with a medical toxicologist may be helpful.^{119,127} Heroin leakage in body packers is less commonly fatal with naloxone, airway protection, and respiratory support as needed. In the asymptomatic body packer, it is reasonable to administer activated charcoal (1 g/kg) and perform continuous whole bowel irrigation with polyethylene glycol. Irrigation should continue in the intensive care unit until there is passage of clear polyethylene glycol solution. CT may be performed to verify passage of all packets.¹¹⁹ Asymptomatic body stuffers may be treated with activated charcoal and observation. Whole bowel irrigation is warranted with drug intoxication in body stuffers as well.¹²⁸

FOREIGN BODIES OF THE SMALL AND LARGE INTESTINE

Once in the small intestine, the most common impaction point is the ileocecal valve, followed by the hepatic and splenic flexures. Sharp objects tend to turn so that the blunt end leads and the sharp end trails.⁵ Management of sharp FBs in the intestine includes daily radiographs to document progression of the FB. If there is no distal

progression over a 3-day period or if the patient becomes symptomatic, emergent surgical consultation should be obtained.⁵

RECTAL FOREIGN BODIES

A wide variety of rectal FBs as well as complications from retained FBs have been reported. Anorectal FBs may infrequently be the result of an orally ingested sharp object that becomes impacted; however, the majority are the result of objects that are inserted through the anal canal.^{6,129} Sharp ingested FBs usually present with symptoms of impaction such as bleeding, perforation, or abscess. The patient does not usually remember the ingestion and the object is identified during surgery.

Most rectal FBs have been inserted deliberately by the patient or a sexual partner. Objects inserted for sexual stimulation are typically blunt, and often resemble a penis in size and shape.^{130–135} Repeated insertion of rectal FBs results in increasingly lax rectal tone, which allows patients to insert progressively larger objects that may be more difficult to remove. There are reports of psychiatric patients inserting sharp FBs to injure the clinician performing a digital rectal examination.³² Assault victims may present with retained objects or fragments that may be blunt or sharp. Drug users may hide drugs or drug paraphernalia in their rectum, and prisoners have been found to conceal weapons in their rectum. Similar to ingested objects, inserted FBs may cause complications, but they are more frequently brought to the clinician's attention because of an inability to remove the object.

An accurate history may be impeded by the patient's embarrassment, which is also responsible for delays in presentation.¹³⁶ Fabricated histories are not uncommon, but gastrointestinal symptoms such as rectal or abdominal pain, decreased bowel movements, or bloody stools may signal real complications. The physician should seek an accurate history in a nonjudgmental and supportive manner, obtaining information about the substance, size, and shape of the object, duration of impaction, attempts at removal, and any symptoms that have occurred since insertion. The patient should be questioned regarding the possibility of assault.¹³²

Abnormalities in vital signs and abdominal findings suggesting perforation or obstruction should be sought.¹³⁶ An examination of the anus followed by a digital rectal examination or anoscopy may reveal the FB location or signs of trauma. If there is the possibility of a sharp object, digital rectal examination should be replaced with anoscopy or may be delayed pending radiography. Plain radiographs are indicated in almost all cases except those that have clinical indications for CT, obviating the need for plain films. Air-filled objects such as plastic bottles may appear as a gas pattern in the shape of the FB. Rectal contrast can be given to outline radiolucent FBs. Free air and signs of obstruction should be sought.

Management of a rectal FB depends on the location and nature of the object. Rectal FBs are classified by location into 2 categories: low-lying and high-lying. Low-lying FBs are located within the rectal ampulla, are usually palpable on a digital rectal examination, and can often be removed by an emergency physician. High-lying FBs are located proximal to the rectosigmoid junction and require sigmoidoscopy for removal, often under general anesthesia.^{6,137} These FBs are often long straight objects that are unable to navigate the curvature of the anorectal angle.¹³⁸ Removal of the FB by an emergency physician is contraindicated when there are signs of perforation, if sharp objects such as broken glass are present, or when the FB is high-lying. In these circumstances, or if attempts at removal by the emergency physician have failed, a surgical consultation is needed.

Before attempting to remove a rectal FB, premedication with a benzodiazepine calms the patient and relaxes the anal sphincter. However, procedural sedation may impede the patient's ability to assist with expulsion of the FB by performing the Valsalva maneuver.¹³² A perianal block using local infiltration of 1% lidocaine and 0.5% bupivacaine will allow greater dilation of the anal sphincter.^{136,139} The patient may be placed in the Sims, knee-chest, or lithotomy position during the extraction. The most appropriate position is determined by the character of the particular FB being removed. If the lithotomy position is used, the clinician may use suprapubic pressure to assist in expulsion of the FB.

Several methods for removal have been described. The simplest is to use suprapubic pressure from above the object while the examiner grasps the object with a finger from below.¹³⁹ If the FB has an accessible edge, an instrument such as a forceps may be used to grasp and remove the object under direct visualization with an anoscope or Parks retractor.¹³⁹ Most FBs in the rectum do not have a convenient edge to grasp, and attempts to withdraw them may be made using a Foley catheter or endotracheal tube with the balloon inflated beyond the object. The stiffness of an endotracheal tube allows passage past the object, but might increase the risk of perforation. If a Foley is employed, the stiffness of a fairly large (20–26 French) 3-way catheter with a 30-cc balloon is required. Hollow objects such as jars or bottles create a vacuum as they are pulled distally in the rectum, making removal difficult. In these cases, the Foley or endotracheal tube with its tip beyond the object can relieve the vacuum, if necessary with the assistance of gently insufflated air (**Fig. 10**). Many other techniques for

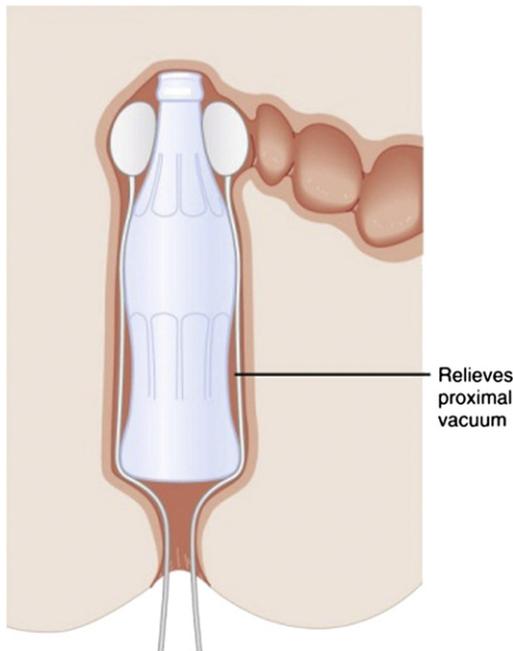


Fig. 10. Using a Foley catheter in the removal of a rectal FB. The balloon is placed proximally to the foreign object and inflated. More than one catheter may be used. The use of a Foley catheter or an endotracheal tube may be especially useful in the removal of hollow objects such as jars or bottles, so that the vacuum created by pulling on these objects is relieved. (From Coates WC. Anorectal Procedures. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 5th ed. Philadelphia: Elsevier, 2010; with permission.)

removing FBs from the rectum have been described, but are beyond the scope of this article, and should be reviewed in standard texts of emergency medicine procedures.

Serious complications from FB removal include deep mucosal tears, hemorrhage, and perforation. Even after an easy extraction, flexible sigmoidoscopy with or without plain radiography has been recommended for all patients. Observation with serial abdominal examinations may also be required.^{136,137} Patients with symptoms or signs of perforation should be observed even after a normal sigmoidoscopic examination. Discharge instructions should include strict return precautions and education regarding symptoms of bleeding, perforation, or infection.

ANORECTAL EMERGENCIES

Anorectal disorders are commonly encountered in the ED setting. While the minority is life-threatening, there are many conditions that cause considerable discomfort. An understanding of anorectal anatomy is essential to understanding the disease processes that occur in this region. This section focuses on diseases that are commonly encountered or may require emergent management.

Anatomy

The anorectum is the terminal portion of the GI tract. The rectum is continuous proximally with the sigmoid colon and distally with the anal canal (**Fig. 11**). The flexure of the rectosigmoid junction lies anterior to the S3 vertebra. The rectum, about 15 cm in length, lies on the curved anterior surface of the sacrum and coccyx. The dilated terminal portion of the rectum is where the accumulating fecal mass is held until

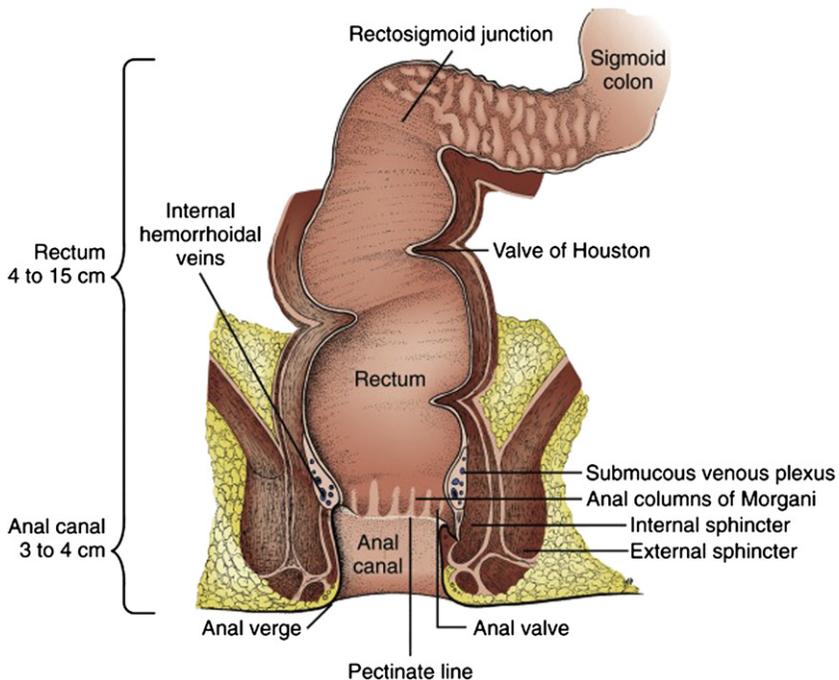


Fig. 11. Normal anatomy of the terminal gastrointestinal tract. (From Coates WC. Anorectal Procedures. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 5th ed. Philadelphia: Elsevier, 2010; with permission.)

defecation in the rectal ampulla. The rectal ampulla narrows and forms a 90° angle with the anal canal, which traverses the pelvic diaphragm consisting of the levator ani and coccygeus muscles.^{140,141} The anus is 2.5 to 5 cm long. The anal canal is surrounded by the internal and external anal sphincters. The internal anal sphincter is a thickened extension of the circular smooth muscle layer of the rectum, and receives support from the levator ani muscles. It is innervated by parasympathetic fibers of the pelvic splanchnic nerves and, except during defecation, is tonically contracted. The external anal sphincter is a large broad circumferential band of voluntary muscle that is an extension of the levator ani and puborectalis muscles, and surrounds the entire length of the anal canal. It is innervated mainly by S4 fibers of the inferior rectal nerve. When feces or gas distends the rectal ampulla, the internal anal sphincter relaxes, requiring voluntary contraction of the external anal sphincter to prevent incontinence.¹⁴⁰

The mucosa of the anal canal transitions from columnar epithelium at the dentate line to squamous epithelium at the orifice. Superior to the dentate line, folds of mucosa extend longitudinally to form the columns of Morgagni. Between these columns are anal crypts that contain mucus-forming glands responsible for lubricating the feces to facilitate evacuation. If these glands become obstructed, they can become infected and form abscesses or fistulae.¹⁴¹

The superior rectal artery supplies the rectum superior to the pectinate line, and the two inferior rectal arteries supply the anal canal. Superior to the pectinate line, blood drains from the internal rectal plexus through the superior rectal vein to the portal system. Distally the inferior rectal plexus drains through the inferior rectal veins to the caval system.¹⁴⁰

The nerve supply superior to the pectinate line contains visceral fibers from the inferior hypogastric plexus and sympathetic trunk. Inferior to the pectinate line, somatic fibers from branches of the pudendal nerve are the reason thrombosed external hemorrhoids and anal fissures cause sharp localized pain.¹⁴⁰

Hemorrhoids

The hemorrhoidal venous plexus is a series of vascular cushions composed of small blood vessels and smooth muscle fibers, which are thought to contribute to anal continence.¹⁴² Symptoms occur when they become (for reasons that are disputed) engorged, inflamed, thrombosed, or prolapsed. As early as the third decade of life the connective tissue supporting the cushions begins to deteriorate, and venous distention may occur when there is interference with venous drainage. There is controversy as to whether the increased intra-abdominal pressure from constipation and/or straining at stool is sufficient to cause hemorrhoidal distension.^{143–147} Pregnancy predisposes women to symptomatic hemorrhoids; however, most symptoms resolve after pregnancy.¹⁴² Portal hypertension was long thought to be associated with symptomatic hemorrhoids; however, adult patients with portal hypertension have the same incidence of symptomatic hemorrhoids as normal controls.^{148–150}

Patients may attribute any perianal condition to hemorrhoids, so a careful history and physical examination are important. Symptoms attributable to hemorrhoids can be divided into conditions associated with internal hemorrhoids and those associated with external hemorrhoids. Internal hemorrhoids are located in 3 major cushions (left lateral, right posterior, right anterior) above the pectinate line where there are no somatic sensory nerves, so they do not cause localized somatic pain. Patients often present with painless bleeding or prolapse. Internal hemorrhoids are classified into 4 degrees according to severity of prolapse. First-degree internal hemorrhoids protrude into the anal canal and may cause a sensation of fullness. Second-degree

internal hemorrhoids prolapse externally during defecation, but spontaneously reduce after the bowel movement. Third-degree internal hemorrhoids may prolapse spontaneously or during a bowel movement and remain outside the anal canal until manually reduced. Spasm of the sphincter complex about the hemorrhoid may cause pain, which is relieved with reduction. Fourth-degree hemorrhoids are permanently prolapsed. Pain may induce sphincter spasm that can cause thrombosis, which may subsequently progress to gangrene. External hemorrhoids are located anywhere circumferentially along the anoderm and are innervated by cutaneous branches of the pudendal nerve and the sacral plexus. Symptoms of external hemorrhoids are usually related to acute pain with thrombosis or to pruritus.

Treatment of hemorrhoids should be pursued only if the patient is experiencing symptoms. Patients with discomfort from nonthrombosed external hemorrhoids or first-degree internal hemorrhoids may be treated conservatively with the W.A.S.H. regimen¹⁵¹ (**Box 1**) and oral analgesics. Bathing in a tub of warm water is thought to relieve anal discomfort by relaxing the anal sphincter.¹⁵² Application of ice cubes may also provide relief by reducing inflammation and causing vasoconstriction in the area. The average American diet consists of 8 to 15 g of fiber per day. A high-fiber diet consisting of 25 to 30 g of dietary fiber daily allows easier passage of stool, and with water intake should be prescribed to avoid constipation and promote regular well-formed stools that can be passed without straining. Stool softeners may be used acutely for patients with hard stools. Topical hydrocortisone may relieve bleeding from internal hemorrhoids or itching from external hemorrhoids; however, it should be used for limited periods to avoid atrophic changes in the skin.¹⁴³ Dibucaine ointment is available over the counter, and can be applied to relieve pain or itching. Topical nifedipine and nitrates have also been used successfully.^{153,154}

Patients with second-degree or third-degree internal hemorrhoids may also benefit from the W.A.S.H. regimen; however, they should be referred to a surgeon for definitive management. Banding, sclerotherapy, photocoagulation, and laser ablation are definitive therapeutic options. If a fourth-degree hemorrhoid is thrombosed or gangrenous, the patient should undergo emergent hemorrhoidectomy.¹⁴³

Acutely thrombosed external hemorrhoids may be excised in the ED. If not excised, the thrombus will begin to spontaneously resolve within 72 hours and will completely resolve in 10 to 14 days, so patients who present late or with diminishing pain should be managed conservatively.^{142,155} Conversely, patients who present within 48 hours of symptom onset are most likely to benefit from excision.^{155–157} When excising a thrombosed external hemorrhoid, a local anesthetic agent is applied either just under the skin surface of the hemorrhoid or in a field block under its base. After anesthesia, an elliptical piece of skin is excised and the underlying thrombus is removed (**Fig. 12**). If an area of skin is not excised, recurrence and/or skin tag formation are

Box 1**The W.A.S.H. Regimen**

Warm water

Analgesic agents

Stool softeners

High-fiber diet

From Coates WC. Disorders of the anorectum. In: Marx JA, Hockberger RS, Walls RM. Rosen's Emergency Medicine: Concepts and Clinical Practice, 7th ed. Philadelphia: Elsevier, 2010; with permission.

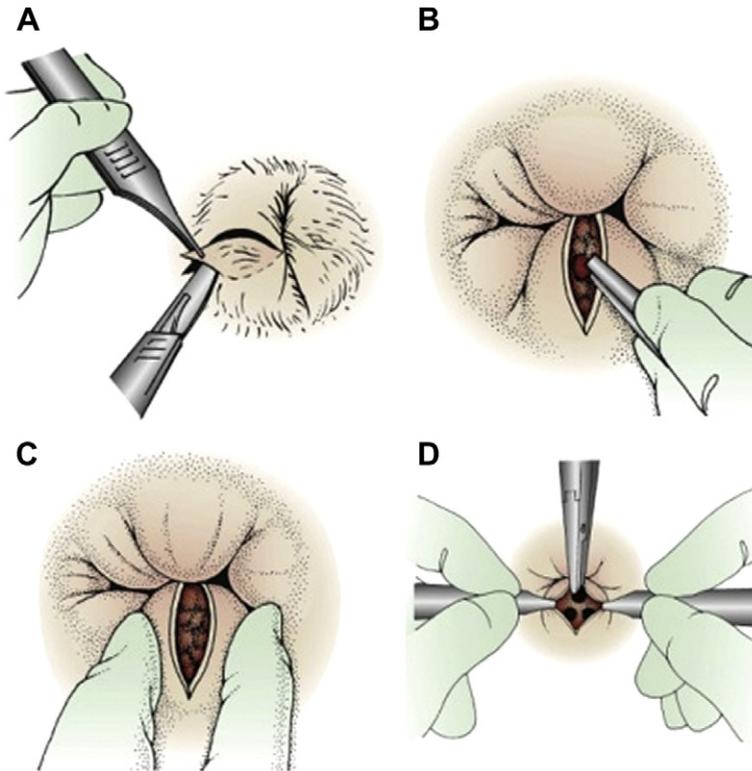


Fig. 12. (A–D) Excision of a thrombosed external hemorrhoid. (A) The thrombosed hemorrhoid is unroofed using an elliptical or triangular incision. The overlying skin is removed to prevent recurrence or skin tag formation. (B) Blood clots are removed with forceps or a small hemostat. (C) Multiple clots may be present. All clots should be removed. (D) Once the initial clot is removed, an assistant spreads the edges of the incision so that other clots that may be present can be identified and removed. (From Coates WC. *Anorectal Procedures*. In: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 5th ed. Philadelphia: Elsevier, 2010; with permission.)

more likely.^{158,159} The skin margins are left open and dressed when bleeding is controlled, occasionally requiring the application of a hemostatic agent such as gel-foam. The patient should be instructed to avoid the use of toilet paper, and to wash with mild soap and water in the shower after bowel movements. Topical creams such as Preparation H or Anusol HC may provide some relief of anal discomfort. Antibiotics are not indicated.

Anal Fissures

Anal fissures are the most common cause of painful rectal bleeding and may extend from the anal verge as far as the pectinate line. Fissures are usually caused by the forceful passing of a large hard stool, but may be related to prolonged diarrhea.¹⁴² Anal fissures can be exquisitely painful and may last for months if not treated promptly, and are most common among infants and patients between 30 and 50 years of age.^{160,161} Most fissures occur along the posterior midline. Ten to fifteen percent of fissures occur at the anterior midline, and are more common among women.^{142,161} Multiple fissures or fissures in other locations should raise the suspicion of systemic

diseases such as Crohn disease, human immunodeficiency virus (HIV), tuberculosis, syphilis, or leukemia.¹⁶² If fissures are not treated early they result in a vicious cycle of anal spasm, incomplete evacuation, constipation, and further injury during the next stool passage. Chronic fissures may display the classic “fissure triad” of a deep ulcerated crater with raised edges, sentinel pile, and enlarged anal papillae. The sentinel pile is a prominent posterior skin tag that may be large enough to be confused with an external hemorrhoid or to mask the presence of the fissure. This chronically inflamed tissue resists healing.

The initial symptom of an anal fissure is sudden sharp pain that may be accompanied by a small amount of bright red blood on the stool or toilet paper. This initial pain is followed by a dull ache that may last for hours, due to sphincter spasm. Subsequent bowel movements cause similar symptoms. Because most internal hemorrhoids cause painless bleeding, and external hemorrhoids are not painful unless thrombosed, these conditions should not be confused with a fissure. The fissure is usually visible with manual retraction of the buttocks with the patient in the knee-chest position. Reflex spasm and edema may also be noted. White connective tissue bands of the internal anal sphincter may be visible at the base of the deep chronic fissures.¹⁴²

Management of anal fissures focuses on early healing to prevent chronic or permanent alteration of the inflamed tissue. This aspect is important because acute fissures almost always respond to medical therapy whereas chronic fissures have much higher failure rates with medical therapy, and surgical therapy, while successful most of the time, is frequently complicated by incontinence. Management begins with the W.A.S.H. regimen (see **Box 1**).¹⁵¹ Further relaxation of sphincter spasm may be achieved with a variety of oral, transdermal, and topical formulations of nitrates and/or calcium channel blockers.^{161,163–165} Local injection of botulinum toxin may also obviate the need for surgical intervention, though it can cause temporary incontinence.^{166–169} Most patients experience some relief with conservative management within 2 to 3 days, and acute fissures may completely resolve within a month if treated adequately. Acute care of patients with chronic fissures also focuses on analgesia and reduction of sphincter tone, but may ultimately require sphincterotomy.¹⁴²

Anorectal Abscesses

Anorectal abscesses result when drainage of the mucus-producing glands is prohibited by obstruction of the anal crypts, stasis, suppuration, and abscess formation. Bacterial cultures are usually polymicrobial and often include *Staphylococcus aureus*, *Escherichia coli*, *Streptococcus*, *Proteus*, and *Bacteroides* species. A smaller number of abscesses result from inflammatory bowel disease, trauma, or an atypical infection such as tuberculosis, actinomycosis, or lymphogranuloma venereum.^{170–172} For clinical purposes, there are two categories of anorectal abscesses. Perianal abscesses, which do not involve the deep tissue spaces of the pelvis, can often be managed in ED with caution. Perirectal abscesses should be managed operatively.

Perianal abscesses present with severe pain and swelling in the region of the external anal orifice, which makes sitting or defecating painful. These abscesses occur at the anal verge and the lowest portion of the anal canal. This region is separated from the ischiorectal space by a horizontal fascial septum and is continuous with the fat of the gluteal region; nevertheless these abscesses, like perirectal abscesses, originate from the anal crypts, and therefore extend between the layers of the internal sphincter and those of the superficial and subcutaneous bands of the external sphincter (the intersphincteric space). Physical examination reveals an area of tenderness and induration with or without central fluctuance. The abscesses may extend laterally into the gluteal region, with associated cellulitis.¹⁷³ A sinus tract leading from the obstructed

crypt may be palpated as a cord within the anal canal (if the patient can tolerate a rectal examination). The diagnosis of superficial perianal abscess cannot be made with certainty until a thorough digital rectal examination has evaluated the rectal walls above the anal sphincter for fullness, induration, or tenderness. If the diagnosis is in doubt, there should be a low threshold for pelvic CT (preferably with intravenous contrast).

Superficial well-localized perianal abscesses may be managed with incision and drainage in the ED. A single linear incision may be made over the area of maximal fluctuance, with subsequent packing as is performed with other cutaneous abscesses. If a cruciate incision is made, the resulting flaps should be excised to avoid premature closure and recurrence of the abscess.¹⁷⁴ Probing and breaking up loculations to adequately drain a perianal abscess can be extremely painful, so liberal analgesia is advised. Procedural sedation may be necessary. Procedural sedation before making the incision often allows the clinician the opportunity to perform a more thorough rectal examination to confirm that the abscess does not extend into any of the perirectal spaces. If it does, the procedure should be aborted and surgical consultation obtained. Inadequate analgesia resulting in inadequate drainage is likely the reason why up to 40% of drained perianal abscesses recur and/or form fistulae.^{170,175,176}

Perirectal abscesses also arise from obstructed anal crypts but, because of suppurative extension in directions other than the anal orifice, result in abscess formation in one or more of the deep spaces of the pelvis. These abscesses cannot be adequately drained without operative intervention under general anesthesia.^{142,174} These potential spaces are large and are filled with relatively hypovascular areolar adipose tissue that has limited resistance to a spreading infection. The spaces include the ischioirectal space, the postanal space (connecting the ischioirectal spaces on either side), the intersphincteric space between the internal and external anal sphincters, and the supralelevator space.^{177,178} Supralelevator abscesses are more frequently associated with diabetes, neoplasia, and Crohn disease. Patients with deep abscesses present with poorly localized pelvic and rectal pain exacerbated prior to defecation (due to the previously described relaxation and contraction of the anal sphincters, all of which are directly affected by the inflammatory process) or during defecation. Patients may also describe deep pelvic pain with micturition (due to alterations in the shape of the bladder) and, in women, the vagina, especially with intercourse.

On examination, these patients may have fever or other systemic signs of toxicity. Digital rectal examination, if it can be tolerated by the patient, may reveal exquisite tenderness, fullness, and induration adjacent to the anus or rectum. Even in patients who are unable to tolerate rectal examination, the diagnosis of perirectal abscess is almost certain if there is a history suggesting anorectal infection and if a simple perianal abscess cannot be identified by gentle palpation around the anal orifice. Such patients should be sent for CT of the pelvis to determine the location of the abscess before surgery.^{179,180} Conversely, as previously noted, the presence of a tender mass at the anal verge does not definitively rule in a superficial perianal process, because deep abscesses can finally point beyond the anal margin after suppuration along a long and serpiginous tract through the deep perirectal spaces. Perirectal abscesses should be treated operatively.

Pilonidal Disease

Pilonidal disease describes a spectrum of clinical presentations, beginning with asymptomatic hair-containing cysts and sinuses, which may result in sacrococcygeal abscesses that have a tendency to recur.¹⁸¹ The etiology of these infections, though still debated, probably involves acute inflammation of ingrowing hair follicles, often precipitated by pressure or trauma to the region.^{182–185} Some patients simply present

with an asymptomatic sinus tract in the region of the gluteal cleft, but in the ED patients are more likely to complain of a swollen painful area consistent with an abscess. Acute management involves incision, drainage, and packing of the abscess. The patient should be rechecked in the ED or by a primary physician in 2 days for resolution of symptoms and removal of packing. For large abscesses it may not be possible to remove all the packing after 2 days, mandating a further recheck in 2 days. The patient should be advised to seek evaluation by a surgeon in 1 to 2 weeks so that definitive management can be arranged. Follicle removal and unroofing or excision of the sinus tract may be performed; however, there is evidence that conservative management with local hygiene and shaving the region every 1 to 3 weeks may be as effective as surgery.¹⁸¹

Pruritus Ani

Severe perianal itch is a symptom most frequently seen in aging men. The itch is typically worse during the summer months and at night. There are many causes, but the most common is poor perianal hygiene. Changes in anal anatomy including hemorrhoids, skin tags, fissures, fistulae, obesity, or prolapse make cleaning the perianal region more difficult. Conversely, overzealous anal hygiene may itself be the cause of pruritus, due to the removal of essential oils that maintain the homeostasis of the anal epithelium. Spicy foods, caffeine, milk, tomatoes, and alcohol may alter the pH of feces, exacerbating its irritating effect. Poorly formed or liquid stools also impede anal hygiene. Medications that cause GI irritation or certain antibiotics such as tetracyclines also cause perianal itching.^{142,186} Other causes of anal itching include contact dermatitis, psoriasis, and systemic diseases such as diabetes, renal failure, and iron deficiency. Chronic low-grade trauma from anal sexual practices, sexually transmitted infections, and local infections such as pinworm, scabies, or fungal infections may also cause pruritus. Regardless of the original cause, many cases of pruritus ani become self-perpetuating as a result of the trauma inflicted to the delicate anal skin by scratching and an ensuing itch-scratch cycle. Treatment is based on etiology that can often be identified by history, which should focus on anal hygiene, systemic illnesses, sexual history, and diet. Examination of the patient's skin often reveals the erythematous thickened skin resulting from prolonged scratching. Other findings may include external hemorrhoids, prolapse, or skin tags. Specimens should be obtained for microscopic testing for *Candida* or for pinworm eggs as mandated by clinical findings. A rectal examination should be performed to exclude the presence of a fistula, malignancy, or other lesions.

When poor hygiene is the cause of pruritus ani, the patient should be educated on proper anal hygiene. These patients benefit from washing the perianal region with warm water after bowel movements. As noted, patients should be warned regarding overzealous washing or the use of soaps, scents, or detergents in the region. The area should be patted dry rather than wiped, which may cause further skin trauma. Loose-fitting cotton underwear to promote air circulation and decrease perspiration is helpful. Tepid sitz baths and/or application of ice may provide temporary relief, especially in the evening when symptoms are worse. Patients should receive dietary fiber supplements, and be advised about ways to maintain a high-fiber diet and good oral hydration to promote regular bowel movements with well-formed stools. Specific causes of pruritus should be managed accordingly.¹⁸⁶

Rectal Prolapse

Rectal prolapse may include all layers of the rectum (procidentia) or the mucosal layer alone (**Fig. 13**).¹⁸⁷⁻¹⁸⁹ Internal prolapse (internal intussusception) may also occur,

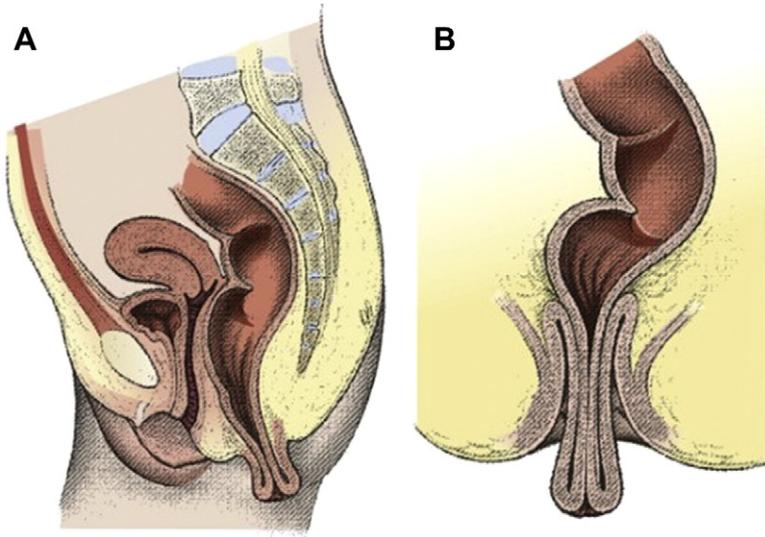


Fig. 13. Rectal prolapse. (A) Complete procidentia or rectal prolapse involving all layers of the rectum. (B) Intussusception of the sigmoid colon beyond the anus. (From Kratzer GL, Demarest RJ. Office Management of Colon and Rectal Disease. Philadelphia: WB Saunders, 1985; with permission.)

usually in elderly women, but is not discussed here. Procidentia is more common in elderly women with chronic constipation, and may be accompanied by uterine prolapse and/or cystocele. Patients often present with the sensation of an anal mass at defecation that usually retracts when the patient stands up.¹⁸⁷ As the disease progresses the mass no longer retracts spontaneously, and will eventually prolapse spontaneously during daily activities (**Fig. 14**). Mucosal prolapse may also be seen in children younger than 3 years, and is most often associated with cystic fibrosis or malnutrition.¹⁹⁰ The parent may report protrusion during defecation, and there may be small amounts of blood or mucous in the stools.



Fig. 14. Rectal prolapse that does not spontaneously reduce requires manual reduction. (From Coates WC. Anorectal Procedures. In: Roberts JR, Hedges JR, eds. Clinical Procedures in Emergency Medicine, 5th ed. Philadelphia: Elsevier, 2010; with permission.)

Manual reduction of proctidentia or mucosal prolapse is performed by gentle constant pressure on the mass over several minutes. Sedation or a field block with local anesthesia may be necessary for successful reduction. Granulated sugar applied to the prolapsed rectum may aid in reduction by desiccation of the mucosa, thus reducing edema.¹⁹¹ After successful reduction, both adults and children should be referred for outpatient evaluation for an underlying etiology.^{181,192-196} Parents should be instructed on the use of increased dietary fiber and oral hydration to prevent constipation.¹⁸⁹ If reduction is unsuccessful or if the proctidentia is incarcerated, ischemic, extensively ulcerated, or severely traumatized, immediate surgical consultation should be obtained.¹⁸⁹

SUMMARY

Ingested FBs are usually benign, but impacted FBs are potentially life-threatening. The ED management of FBs in the GI tract varies depending on the nature of the object, its anatomic location, and the symptoms experienced by the patient.

Anorectal disorders are frequently encountered in the ED. An understanding of anorectal anatomy and common disorders allows the emergency physician to provide relief and resolution in the majority of cases.

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