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Gastrointestinal foreign bodies are commonly encountered in small animal practice. Due to indiscriminate eating habits, foreign bodies are more common in dogs than cats; however, frequent ingestion of hair and the playful behavior of cats cause ingestion of foreign objects. Most ingested foreign bodies pass uneventfully through the gastrointestinal tract. Owners often observe or suspect foreign body ingestion; however, animals, especially young, that present with regurgitation, vomiting, diarrhea, or signs of small intestinal obstruction, should always be considered suspects for foreign body ingestion. The decision to remove a foreign body must be individualized for each case. Careful observation by the owner, sequential radiographic evaluation to assess movement of the foreign body, and absence of clinical signs are all components of conservative management. The size, shape, contour, and location of the foreign body, along with the time since ingestion and the progression and severity of clinical signs are important factors to consider when assessing intervention versus conservative management. Large, pointed, irregular, and caustic-containing foreign bodies should always be removed to prevent severe injury to the gastrointestinal tract. Obstructive foreign bodies in the esophagus and small intestine should be considered emergencies and rapidly removed once the patient is stabilized. Linear small intestinal foreign bodies associated with progressive clinical signs should be removed.

The most commonly observed esophageal foreign bodies are bones, rawhide chew toys, fish hooks, and hair balls. Obstructive foreign bodies should be considered an emergency because the longer they remain in place, the greater the chances of severe esophageal injury, perforation, and mediastinitis. Most esophageal foreign bodies can be successfully removed endoscopically. Surgery of the esophagus should be avoided if possible, due to difficult access, poor healing capability, and morbidity. Foreign bodies commonly lodge at the thoracic inlet, base of the heart, or diaphragmatic hiatus. The most common clinical signs associated with esophageal foreign bodies are regurgitation, excess salivation, anorexia, odynophagia, and respiratory signs reflecting aspiration pneumonia. Using flexible endoscopic techniques, a two-prong, four-prong, rat-tooth, basket, or snare forceps can usually result in successful delivery of the foreign body. In a rare case, when a foreign body cannot be endoscopically extracted, it can be gently pushed into the stomach where gastric acid may dissolve it or more room is available for endoscopic manipulation and retrieval. Alternatively, surgical removal from the stomach can be performed. Large foreign bodies may be so tightly lodged within the esophagus, that flexible endoscopic forceps cannot grasp the object tightly enough to result in successful removal. These foreign bodies are often located at the thoracic inlet or the base of the heart and can often be retrieved by using a rigid forceps placed along side of the flexible endoscope. Rectal biopsy forceps or automotive bolt retrieval devices can be used. These large foreign bodies often get stuck at the pharynx, but can be delivered by grasping with curved Carmalt forceps.

Fish hooks can be very difficult to remove; however, if the tip of the hook is protruding into the lumen, it can be grasped and the entire hook pulled through the mucosa and removed. If fishing line is attached, it can saw through the esophagus during this maneuver, so this should only be performed if the endoscopist feels the hook is superficially lodged within the mucosa or submucosa to prevent a full-thickness laceration. If the tip of the hook is not visible but appears to be embedded only in the mucosa or submucosa, it can be gently pulled through the mucosa, creating a superficial tear that usually heals without complication. If the hook appears to have passed through the esophageal wall, it should be surgically removed. The endoscopist and surgeon can work together, with the surgeon cutting off the tip and barb of the hook and the endoscopist removing the remainder of the hook through the esophageal lumen. In this manner, the esophagus does not have to be incised. In addition the surgeon can follow the light from the endoscope while making the incision into the thorax.

Hair balls, which are most commonly seen in cats, often fall apart when grasped with foreign-body-retrieval forceps. Multiple extractions may be necessary to remove them. Sometimes, it is best to push the hair ball into the stomach where there is more room for endoscopic manipulation. Hair balls can often be grasped with a basket or snare forceps in the stomach and removed.

When retrieving either an esophageal or gastric foreign body, air should be insufflated during withdrawal of the endoscope to help dilate the esophagus and prevent damage to the esophageal mucosa. In some cases, the endoscope can be placed inside a rigid proctoscope and the foreign body grasped and withdrawn into the rigid outer protector. Both the endoscope and proctoscope can be withdrawn simultaneously protecting the esophageal mucosa. Commercially available endoscopic hoods are available to protect the mucosa from the foreign body during retrieval.

Perforation and mediastinitis is a severe complication of esophageal foreign bodies. Thoracic radiographs taken after endoscopy may demonstrate pneumomediastinum if perforation has occurred. If a diagnosis cannot be made with survey radiographs, an iodine contrast study can be performed. Contrast studies can be falsely negative if the foreign body is still in place. The foreign body may obstruct the perforation site, blocking leakage of contrast. Small perforations can be managed medically, while large perforations require surgical treatment.

Foreign-body-induced esophagitis and ulceration require medical management. A percutaneous endoscopic gastrostomy tube can be placed to rest the esophagus and provide nutrition if severe mucosal damage occurs. A histamine-2 antagonist should be used to decrease acid secretion (cimetidine 10 mg/kg TID, ranitidine 2 mg/kg TID, or famotidine 0.5 mg/kg BID). Refluxed gastric acid will prevent mucosal healing. Gastric reflux can also be decreased by using metoclopramide (0.2-0.4mg/kg TID). Metoclopramide will increase lower esophageal sphincter tone and accelerate gastric emptying. Sucralfate suspension 1g/25kg TID can be given to coat and protect the ulcerated areas. With minimal to moderate trauma oral feeding can usually be started the next day. Severe damage will require a longer period of NPO. Medication should continue for approximately 7-10 days. Stricture formation can occur following foreign body retrieval. Cases with severe esophagitis or ulceration should
be endoscoped in seven to ten days to assess stricture formation. If stricture has occurred, it can be dilated with balloon catheters.

Gastric foreign bodies are easier to remove than esophageal foreign bodies because more room is available for endoscopic manipulation. Approximately 50% of gastric foreign bodies removed at my clinic have caused vomiting while the remainder are found in asymptomatic animals as incidental findings on radiographic studies performed for other reasons or because the owner has observed or suspected ingestion. A wide variety of foreign bodies can be found including sewing needles, popsicle sticks, articles of clothing, hairballs, coins, toys, batteries, and a variety of plastic or metal household items. Severe acute vomiting can occur if the foreign body has obstructed the pylorus, but this is uncommon in my experience. Vomiting associated with gastric foreign bodies is usually caused by gastritis induced by the foreign body.

Difficulty is often encountered when pulling the foreign body through the lower esophageal sphincter. The endoscopic forceps producing the strongest purchase on the foreign body should be used. The foreign body and forceps should be pulled against the endoscope and air insufflated to dilate the lower esophageal sphincter. Continued insufflation of air, or the use of a rigid proctoscope or endoscopic hood, in the esophagus is recommended to reduce esophageal mucosal damage.

Often, acute foreign body ingestion occurs with a stomach full of food. A food-distended stomach may be associated with an increased risk of aspiration pneumonia during general anesthesia; as well as it may obscure the foreign body. Allowing the food to empty from the stomach may facilitate identification and retrieval of the foreign body and reduce the risk of aspiration, but may also result in perforation or small intestinal obstruction, depending on the nature of the foreign body.

Lead or zinc (pennies) objects should always be rapidly removed as gastric acid enhances availability and absorption of the metal and can lead to lead poisoning or a hemolytic crisis. Button batteries from watches and toys are extremely corrosive after interaction with gastric acid and should be rapidly removed.

Small intestinal foreign bodies are not easily removed endoscopically. Small objects usually pass through the intestinal tract, but larger foreign bodies can result in complete small intestinal obstruction, which is a surgical emergency. Foreign bodies often lodge at the ileocolic junction. The more orad the foreign body is located in the intestine, and the more complete obstruction it produces, the more acute, severe, and progressive clinical signs such as vomiting, anorexia, depression, dehydration, and abdominal pain are. Physical examination may reveal a dilated segment of small intestine or a palpable mass. Survey radiographs often demonstrate obstructive ileus and severe small intestinal dilatation. Endotoxemia, electrolyte, and acid-based derangements are common. Secretion of fluid into the bowel lumen orad to the obstruction and vomiting can result in severe dehydration or hypovolemic shock. Bacterial overgrowth, especially Clostridia sp., due to stagnation of intestinal contents, is associated with endotoxemia. Vigorous fluid therapy to correct fluid, electrolyte, and acid-base disorders and broad-spectrum intravenous antibiotics should be administered prior to exploratory surgery to remove the foreign body and resect devitalized intestine. It is very difficult to endoscopically remove an obstructed SI foreign body, even in the duodenum.

Linear foreign bodies are more frequently encountered in cats than in dogs. When the linear foreign body becomes fixed orally, the progressive peristaltic movement of the small intestine causes plication along the foreign body. This can result in a sawing movement of the thread or string, resulting in perforation and peritonitis. The linear foreign body will often become fixed in the oral cavity, especially wrapped around the base of the tongue, or at the pylorus. The most common clinical signs seen in cats with linear foreign body include vomiting, anorexia, depression, dehydration, and plicated bunched small intestines on abdominal palpation. Survey radiographs may be necessary to demonstrate the plicated small intestine. Cats without prolonged vomiting, pyrexia, a degenerative left shift on the CBC, or fixation of the foreign body at the pylorus may be managed conservatively by cutting the foreign body in the oral cavity and closely observing the cat for a worsening of clinical signs. Passage of the foreign body may take one to three days. Cats managed conservatively that deteriorate clinically, did not seem to have an increased mortality after surgery when compared to cats that were operated on immediately after the diagnosis has been made. Surgery often requires multiple enterotomies and repair of intestinal perforations. Although I have attempted to remove linear foreign bodies from the small intestine on a few occasions endoscopically, I have never been successful.

PERCUTANEOUS ENDOSCOPIC GASTROSTOMY TUBES

Gastrostomy tubes provide a convenient and nonstressful avenue for enteral nutritional support. Blended nutritionally balanced pet foods can easily be administered through their large diameter. They are better tolerated by the animal during long term use. They are indicated whenever prolonged anorexia is anticipated or if bypass of the oral cavity, pharynx, or esophagus is needed, as long as vomiting does not occur and gastric and intestinal function is normal. Gastrointestinal diseases that may benefit from their use include hepatic lipidosis, oronasal fistula, trauma, or surgery, megaesophagus, esophageal foreign body, severe esophagitis, or esophageal stricture. Most owners can manage tube feeding at home. They can remain in place for months without complications.

Surgical and nonendoscopic techniques have been described and several applicators have been developed. Endoscopic placement does not require a surgical incision, is fast, easy, is done under direct visualization, is associated with few complications, and allows examination of the stomach and duodenum and collection of biopsy samples. A 20-24 French mushroom tipped urinary catheter (Pezzer model drain, Bard Urological Division, Covington, Ga.) is prepared by removing the tip of the mushroom (adds a large hole to the two other holes and allows a thicker gruel to be fed) and adding a piece of catheter 2-3 cm long as an internal stent. Several commercially available veterinary kits are available (percutaneous endoscopic gastrostomy system, VetMed, Sunnyvale, CA and Pezzer catheter assembly, Mill-Rose Laboratories, Mentor, OH) However, the author prefers to make his own PEG kits as they are less expensive and require little preparation time.

Minor variations of the following placement procedure exist. Food is withheld for 12 hours and the animal placed under general anesthesia in right lateral recumbency. A
longer period of fasting may be necessary in animals with esophageal dilation to prevent regurgitation during anesthesia and aspiration pneumonia. An area 15 x 15 cm centered caudal to the costal arch on the left side is clipped, surgically scrubbed, and draped. The stomach is distended with air to displace the liver, spleen, and colon from the gastrostomy site. An assistant depresses the skin and musculature caudal to the last rib, producing a depression visible with the endoscope. The area should not be too close to the pyloric antrum.

A 3 mm stab incision is made into the skin and a 5 cm long 14 gauge over the needle catheter (Sovereign Indwelling Catheter, Monoject, St. Louis, MO) is inserted into the stomach. The needle is removed. The end of a 1.5 m long O suture is passed through the catheter and grasped by an endoscopic foreign body forceps and withdrawn into the endoscope. The endoscope is slowly withdrawn (as the suture is fed through the catheter) and the suture removed from the endoscopic forceps when the endoscope exits the mouth. The suture now passes through the left sided skin incision and exits through the mouth. The catheter is removed from the flank and threaded onto the suture at the animal's mouth end with the thin tapered end placed on first. The suture is tied onto the feeding tube (facilitated by cutting the tip of the tube into a tapered V and passing the suture through it with an 18 g needle) and the catheter-feeding tube assembly is pulled together. The feeding tube should be lubricated.

The suture is slowly withdrawn through the flank, pulling the feeding tube into the stomach and through the body wall, leaving the mushroom tip within the stomach. The endoscope is placed back into the stomach to observe the final placement of the mushroom tip. The tube should be gently placed against the mucosa, too tight can cause necrosis, too loose can allow the stomach to move away from the body wall and interfere with adhesion formation. The tube must be left in place for a minimum of 7-10 days. During this time the stomach will remain against the body wall and localized inflammation will result in a fistulous adhesion.

The author places an external stent, similar to the internal stent against the skin. The position of the tube as it exits the skin is carefully marked to ensure that it does not move into the abdomen, allowing the stomach to move away from the body wall. The junction of the tube and stent is glued and the stent is glued or sutured to the skin. The feeding tube is lubricated. The suture is slowly withdrawn through the flank, pulling the feeding tube into the stomach and through the body wall, leaving the mushroom tip within the stomach. The endoscope is placed back into the stomach to observe the final placement of the mushroom tip. The tube should be gently placed against the mucosa, too tight can cause necrosis, too loose can allow the stomach to move away from the body wall and interfere with adhesion formation. The tube must be left in place for a minimum of 7-10 days. During this time the stomach will remain against the body wall and localized inflammation will result in a fistulous adhesion.

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Complications associated with the procedure are uncommon and usually minor. The most common complication seen by the author is due to excessive tension on the external flange that causes necrosis of skin. Loosening of the stent and topical wound care are all that is needed. Mild pyrexia may occur for several days. Serious complications include excessive tension on the internal flange leading to gastric necrosis and peritonitis, inadvertent removal of the tube by the animal, pulling of the tube through the stomach into the abdominal cavity resulting in delivery of food into the abdominal cavity and peritonitis, leakage of food around the tube into the abdomen, obstruction of the pylorus if the tube is placed too distally, pyloric or duodenal obstruction after tube removal from the internal stent, and splenic hemorrhage associated with insertion.

REFERENCES


