# Esophagus

## ANATOMY

The esophagus is the connecting tube between the pharynx and stomach that functions to transport ingesta and fluids.

**The cervical portion** of the esophagus begins dorsal to the caudal border of the **cricoid cartilage,** run to the left of the trachea as it runs caudally, and ends at the thoracic inlet.

**The thoracic portion** extends from the thoracic inlet, where it is located to the left of the trachea, crosses the trachea to regain its dorsal position at the tracheal bifurcation, and extends caudally to the esophageal hiatus of the diaphragm.

The aorta obliquely crosses the left side of the midthoracic esophagus. In the caudal thorax, the dorsal branches of the left and right vagal nerves run across the side of the esophagus and unite dorsally to form the dorsal vagal trunk, and the left and right ventral branches similarly unite to form the ventral vagal trunk. Both vagal trunks enter the abdomen through the esophageal hiatus of the diaphragm.

**The abdominal portion** of the esophagus is short and wedge shaped, extending from the diaphragmatic hiatus to the stomach.

## Layers of the Esophageal Wall

The outer layer of the esophagus is the **adventitia.**

The **muscularis** is composed of striated muscle for the entire length of the esophagus in dogs, but it changes to smooth muscle in the terminal esophagus in cats.

The **submucosa** contains blood vessels, nerves, and simple mucous glands that secrete mucus, which lubricates the mucosal surface.

The esophageal **mucosa** is composed of a stratified squamous epithelium. In the nondistended esophagus, the mucosa forms numerous large longitudinal folds that can be seen with positive-

contrast esophagography.

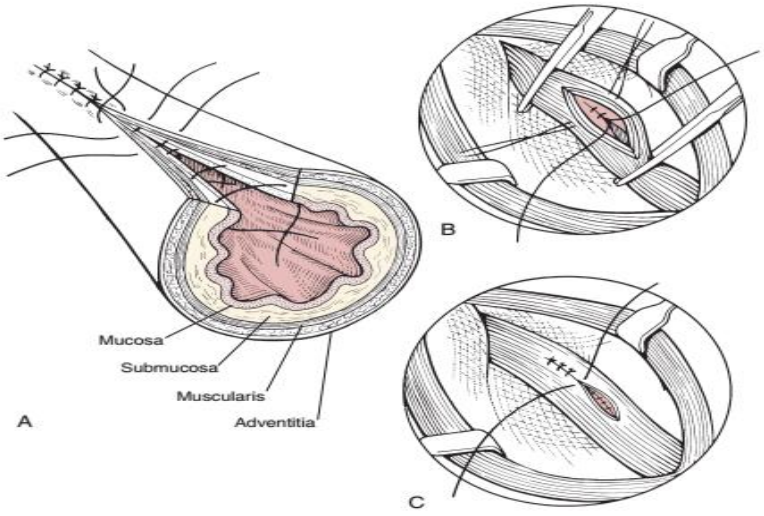


**FIG 20-46.** Esophagotomy closure. **A** and **B,** Close the mucosa and submucosa with simple interrupted sutures so that the knots are intraluminal. **A** and **C,** Appose the adventitia and muscularis with a second layer of simple interrupted sutures oriented with extraluminal knots.

# GENERAL SURGICAL PRINCIPALS

Esophageal surgery is historically associated with a higher prevalence of incisional dehiscence than surgery on other portions of the alimentary tract.

**Several factors may contribute to the high complication rate, including**

1- lack of serosa,
2- the segmental nature of the blood supply,
3- the lack of omentum,
4- constant motion caused by swallowing and respiration,
5- tension at the surgical site.

# SURGICAL TECHNIQUES

## Esophagotomy

**Indications for esophagotomy include**

foreign body removal and closure of esophageal perforations and diverticula.

Esophagotomy can be performed on any portion of the esophagus.

1- The surgical site is isolated with moistened laparotomy sponges, and the esophagus is suctioned transorally to reduce contamination. If fluid or ingesta is present in the esophagus, the esophageal lumen can be occluded cranial and caudal to the proposed incision site with fingers, umbilical tape, or noncrushing clamps.
2- stay sutures and suction can be used to minimize spillage
3- A stab incision is made into the esophageal lumen, and the incision is extended longitudinally as necessary.
4- The esophagotomy incision can be closed with a one- or two-layer interrupted or continuous suture pattern. With a two-layer pattern, **the first layer incorporates mucosa and submucosa, and knots are placed in the esophageal lumen.** The second layer apposes the muscularis and adventitia, with knots placed extralumenally. With a onelayer closure, the suture passes through all layers of the esophageal wall, with limited penetration of the mucosa, and knots are placed extralumenally.
5- Sutures should be placed approximately 2 mm from the cut edge and 2 to 3 mm apart.
6- Integrity of the closure can be tested by distending the esophagus with saline and placing additional sutures to seal any areas

**Transthoracic esophagotomy for removal of a bone in a dog**.

The dog is in left lateral recumbency with its head to the right. Stay sutures of nonabsorbable monofilament material are placed in the wall of the esophagus. of leakage. The patient should not receive food or water by mouth for at least 24 to 48 hours after surgery. Healing of a cervical esophagotomy incision can be delayed by contact with pharyngostomy tubes.

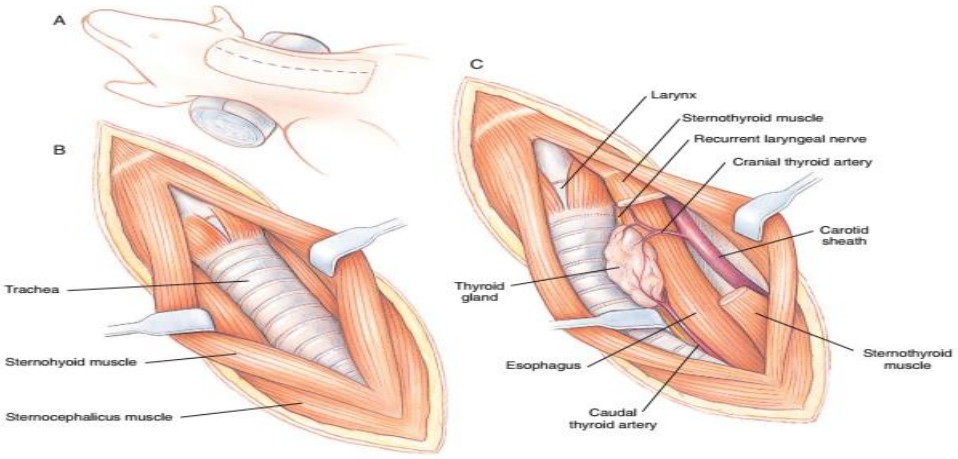


Figure 90-5 Approach to the cervical esophagus. A, Position the patient in dorsal recumbency with the neck resting on a rolled towel. B, The skin is incised from the larynx to the manubrium, and the sternohyoid muscles are separated to expose the trachea. C, The trachea is retracted to the right to expose the esophagus, thyroid, carotid sheath, and recurrent laryngeal nerve. (From Fossum TW: Small animal surgery, St Louis, 1997, Mosby/Elsevier.)

# Esophageal Resection and Anastomosis

Indications for esophageal resection and anastomosis include **treatment of congenital obstructions, acquired discrete strictures, severe localized esophageal injury, esophageal diverticula that cannot be excised by simple esophagotomy, and esophageal neoplasia**.

The length of esophagus that can be resected without undue risk of dehiscence is limited by anastomotic tension. Resection and primary anastomoses of up to 20% of the cervical esophagus and 50% of the thoracic esophagus have been reported in experimental dogs; in clinical patients, however, resection of more than 3 to 5 cm of esophagus has been associated with an increased risk of dehiscence.

1- Circumferential partial myotomy may reduce anastomotic tension. The outer muscle layer is incised 2 to 3 cm proximal or distal to the anastomosis, or both, leaving the inner muscle layer intact.
2- Separation of the muscle layers may be improved by injecting saline into the muscularis.
3- Use of a partial myotomy prevents disruption of the submucosal vascular plexus and subsequent esophageal ischemia, which are observed with full-thickness myotomy, while

providing a similar reduction in anastomotic tension.

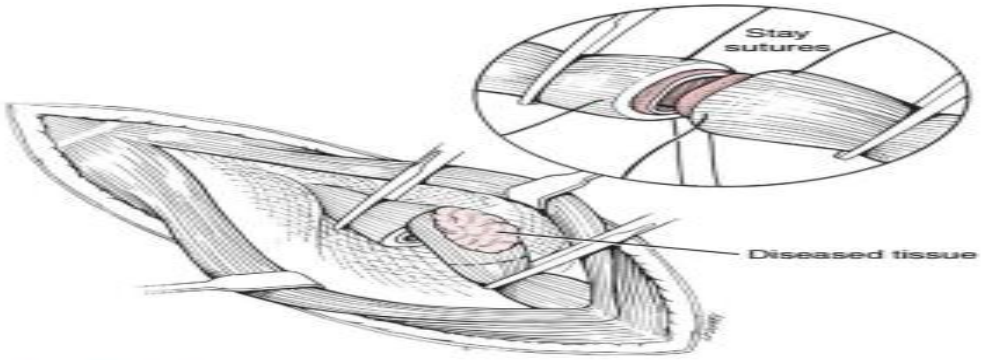


**Figure 90-7** For partial esophagectomy, the esophageal lumen is occluded with noncrushing forceps and mobilized, and the diseased esophagus is resected *(dashed line)*. (From Fossum TW: Small animal surgery, St Louis, 1997, Mosby/Elsevier.)

4- The myotomy heals by secondary intention without stricture or diverticulum formation. Esophageal resection and anastomosis can be performed on any portion of the esophagus. A small amount of esophageal mobilization during surgery is necessary to control spillage and reduce anastomotic tension, but excessive mobilization may compromise segmental esophageal blood supply.

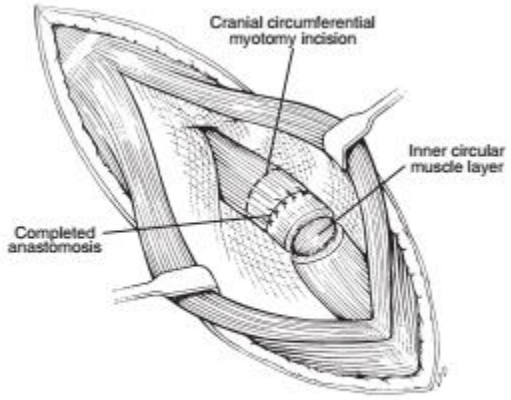


**FIG 20-47.** Tension relieving esophageal myotomy is performed 2 to 3 cm cranial and caudal to the anastomosis.

5- The esophagus should be isolated with moistened laparotomy sponges, and the lumen can be occluded with fingers, umbilical tape, or noncrushing clamps .

6- The diseased portion of the esophagus is resected.

7- Stay sutures facilitate gentle tissue handling and maintain alignment. The remaining segments are supporting caudal thoracic esophageal wounds and closing small defects

because of its vascularity and availability; esophageal stricture formation may also be minimized with omental patching.

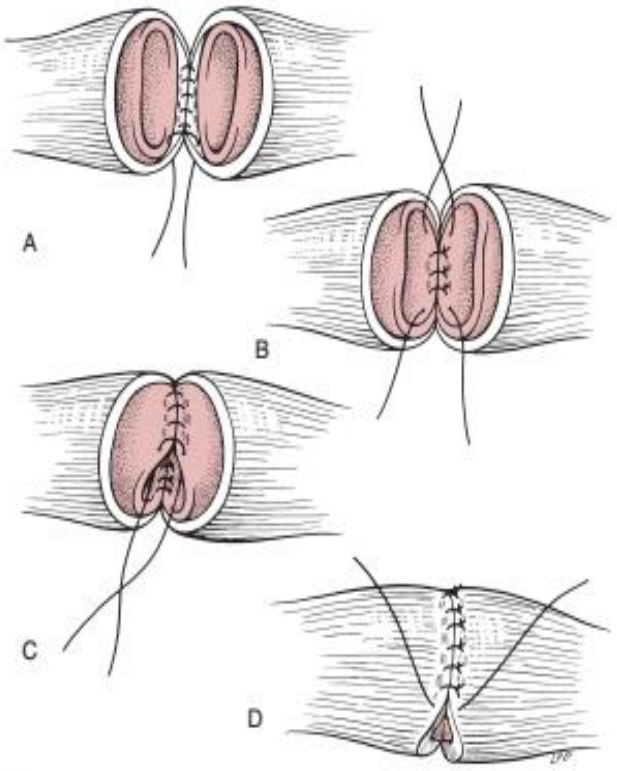


**FIG 20-49.** During partial esophagectomy, appose the ends with two layers of sutures in a four-step procedure. **A,** First, appose the adventitia and muscularis on the far side with simple interrupted sutures and extraluminal knots. **B,** Second, appose the submucosa and mucosa on the far side with simple interrupted sutures using intraluminal knots. **C,** Third, appose the nearside submucosa and mucosa. **D,** Last, appose the nearside muscularis and adventitia.

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# DISEASES OF THE ESOPHAGUS

## Esophageal Duplication Cyst

Esophageal duplication cysts are rare congenital anomalies of the foregut. These cysts are considered duplications when they are located in the esophageal wall and contain two muscle layers and epithelium. Affected animals and humans may be asymptomatic or experience dysphagia or respiratory distress from compression of adjacent structures.

**clinical findings** included a slowly growing, fluctuant mass present on the cranioventral region of the neck since birth. Mucoid fluid was detected on aspiration. The mass was surgically resected easily and did not communicate with the esophagus.

# Esophageal Foreign Bodies

Esophageal foreign bodies are a common problem in dogs and are occasionally diagnosed in cats. The most common foreign bodies in dogs are ingested bones. In cats, fishhooks, needles, and string foreign bodies are more common.

Esophageal foreign bodies most commonly lodge at the thoracic inlet, heart base, and caudal esophagus, where extraesophageal structures restrict esophageal dilatation.

## Clinical Signs

The most classic clinical sign is regurgitation of food within a few minutes of eating. Water is generally retained unless there is complete obstruction.

Other clinical signs include retching, gagging, excessive salivation, restlessness, lethargy, and nappetence. affected animals may remain bright and alert but have weight loss and periodic bouts of regurgitation and inappetence.

Sharp or chronic foreign bodies can result in esophageal perforation, pneumomediastinum, pneumothorax, mediastinitis, pleuritis, pyothorax, mediastinal abscessation, or bronchoesophageal or tracheoesophageal fistulae, with resultant pyrexia, depression, and respiratory distress.* Respiratory distress may also be associated with aspiration pneumonia or impingement of the foreign bodies on the upper airways.

## Diagnosis

Esophageal foreign bodies can usually be diagnosed on survey thoracic radiographs

## Treatment

An initial attempt should be made to extract the foreign body with endoscopy or fluoroscopy using grasping forceps or a balloon catheter.

The foreign body is grasped with forceps and gently rotated to free it and is then withdrawn. A firmly lodged foreign body should not be forced because this may induce or enlarge a perforation.

If the foreign body cannot remove the surgical technique by use the esophagotomy to remove it.

## Esophageal Lacerations

Esophageal lacerations are most commonly caused by penetrating esophageal foreign bodies. The most common injury is a penetrating stick injury in dogs that carry, chew, or retrieve sticks. Esophageal stick injuries generally occur in the cervical esophagus.

### Clinical Signs

Clinical signs include drooling saliva, **bloody saliva,** pain on neck flexion or opening the mouth, cervical subcutaneous emphysema, depression, and collapse.

### Diagnosis

Cervical and thoracic radiographs should be obtained. Acute penetrating injuries to the cervical esophagus result in cervical emphysema.

### Treatment

In dogs with suspected esophageal injuries, surgery should be performed if radiographs show cervical emphysema. A midline cervical approach with division of the sternohyoideus muscles allows examination of the cervical and retropharyngeal region. The penetrating stick injury will result in a tract of traumatized tissue. Foreign material is removed, the esophageal laceration is minimally debrided, and a single- or doublelayered closure performed. The surgical site is lavaged before closure, and a closed suction drain can be placed. In patients with cervical

bite wounds, early examination and treatment under anesthesia is recommended. Extensive trauma, necrosis, and abscesses may require open wound management until tissues are healthy enough to be debrided and closed.

## Esophageal Diverticula

esophageal diverticula are categorized as congenital or acquired; acquired diverticula are further divided into pulsion and traction types.

A **pulsion diverticulum** is an outpouching of mucosa that herniates through a defect in the tunica muscularis.

A **traction diverticulum** is a full-thickness deviation of the esophageal wall.

The diverticulum can become impacted with ingesta, distorting and obstructing the esophageal lumen. Secondary chronic esophagitis and ulceration occur and can result in stricture formation. Peridiverticulitis can cause bronchoesophageal fistulae or adhesions to adjacent lung lobes.

**Clinical Signs**

Clinical signs include regurgitation, retching, gagging, generalized pain, hypersalivation, weight loss, and anorexia. Respiratory distress may be associated with a bronchoesophageal fistula or aspiration pneumonia.

**Lameness associated with secondary hypertrophic osteopathy has been reported**.

## Esophageal Fistulae

An esophageal fistula is an abnormal communication between the esophagus and the trachea, bronchus, lung parenchyma, or the skin.

Esophageal fistulae may be either congenital or acquired.

Congenital fistulae result from an incomplete separation of the tracheobronchial tree from the digestive tract.

acquired esophageal fistulae result from malignancy, infection, and trauma.

**Clinical Signs**

The most common clinical sign is coughing, which may be associated with drinking liquids.

**Treatment**

The fistulous tract should be excised rather than ligated.

With bronchoesophageal fistulae, there is usually extensive pathology in the communicating lung lobe, necessitating lung lobectomy.

With tracheoesophageal fistulae, the tracheal defect should be primarily closed or reconstructed.

In the acute stages,

cervical esophageal fistulae may need to be treated with open drainage. After the esophageal tissues are no longer necrotic or edematous, they can be closed primarily and patched with local muscle flaps.

## Esophageal Neoplasia

Benign tumors include leiomyoma and plasmacytoma The most common site for canine esophageal tumors is in the caudal thoracic esophagus. The most common primary esophageal tumor in cats is squamous cell carcinoma, and the most common site is the cranial thoracic esophagus. Paraesophageal tumors, such as thymic, heart base, and thyroid tumors, can invade the esophagus.