

Esophageal Obstruction in the Horse

Dr. Amelia Munsterman reviews the diagnosis and management of esophageal obstruction in horses.

Speaker Bio:

Dr. Amelia Munsterman graduated from the University of Missouri-Columbia, College of Veterinary Medicine. She completed both a residency in Large Animal Surgery and an MS in Biomedical Sciences at The Ohio State University, and a PhD and Fellowship in Large Animal Emergency and Critical Care at Auburn University. Dr. Munsterman is also certified in acupuncture and spinal manipulation with an MS in Traditional Chinese Veterinary Medicine. She is currently an Associate Professor of Large Animal Surgery and Emergency Medicine at Michigan State University. Dr. Munsterman has authored or co-authored 44 peer-reviewed journal articles, 30 book chapters, and 54 scientific abstracts. Dr. Munsterman is a board-certified diplomate in the American College of Veterinary Surgeons (Large Animal Surgery) and also a board-certified diplomate of the American College of Veterinary Emergency and Critical Care (Large Animal).

Learning Objectives:

1. To develop an understanding of the causes and clinical features of esophageal obstruction.
2. To be able to formulate an appropriate therapeutic plan for treatment of esophageal obstruction, as well as options for persistent obstruction.
3. To understand additional diagnostic tools that may be useful to assess the severity and complications due to the obstruction.
4. To identify additional medical and surgical approaches to resolve and prevent recurrence of esophageal obstruction.

Agenda:

- Anatomic review of the equine esophagus
- Pathophysiology of esophageal obstruction
- Diagnosis and treatment of esophageal obstruction
- Sequelae of esophageal obstruction
- Mitigating recurrence



Esophageal Obstruction in the Horse

Amelia Munsterman, DVM, MS, PhD, DACVS-LA, DACVECC

Outline

- Anatomy Review of the Equine Esophagus

- Clinical Presentation

- Pathophysiology
- Clinical Signs
- Diagnosis
- Treatment
- Prevention



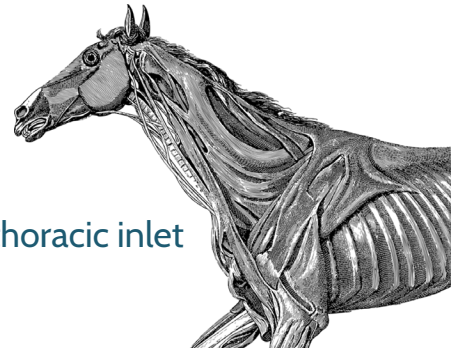
Complications of Esophageal Obstruction

- Mucosal ulceration
- Inability to resolve obstruction
 - Esophagotomy
- Ruptured esophagus
 - Esophagostomy
- Esophageal strictures
 - Esophagomyotomy
- Esophageal diverticulum
 - Mucosal inversion



Equine Esophageal Anatomy

- Length of the esophagus: 125 to 200 cm
- Spans the cervical region, thoracic and abdominal cavities
- Positioning
 - Originates and lies dorsal to trachea for first third
 - Courses lateral to trachea on left side of neck to the thoracic inlet
 - Lies ventral to the trachea within the thorax



Microscopic Anatomy of the Esophagus

- Elastic inner layer composed of mucosa and submucosa
 - Composed of stratified squamous epithelium
 - The “holding layer” of the esophagus
 - Freely movable
- Muscular outer layer
 - Striated muscle up to the base of the heart
 - At this point, turns to smooth muscle
- Surrounded by inelastic tunica adventitia

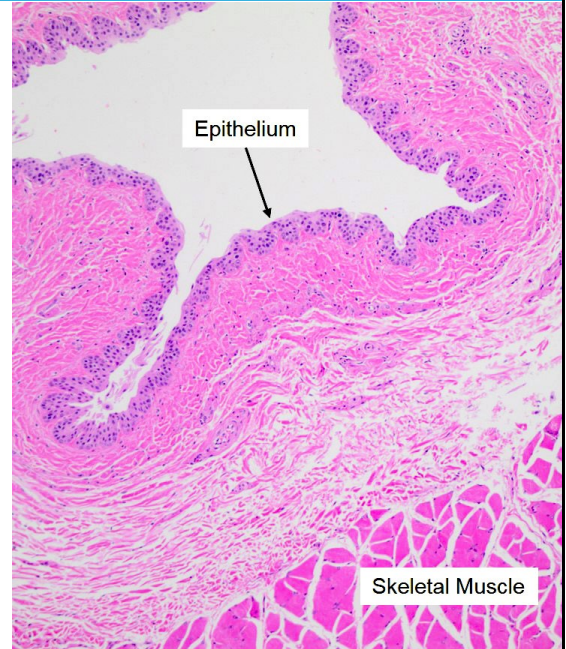


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Equine Esophageal Obstruction

- ...Also called “choke”
- **Most common abnormality of the equine esophagus**
- **Causes of obstruction**
 - Inappropriate feed materials
 - Poor quality roughage
 - Large sized treats
 - Beet pulp
 - Poor dental care or tooth senescence



Clinical Signs of Esophageal Obstruction

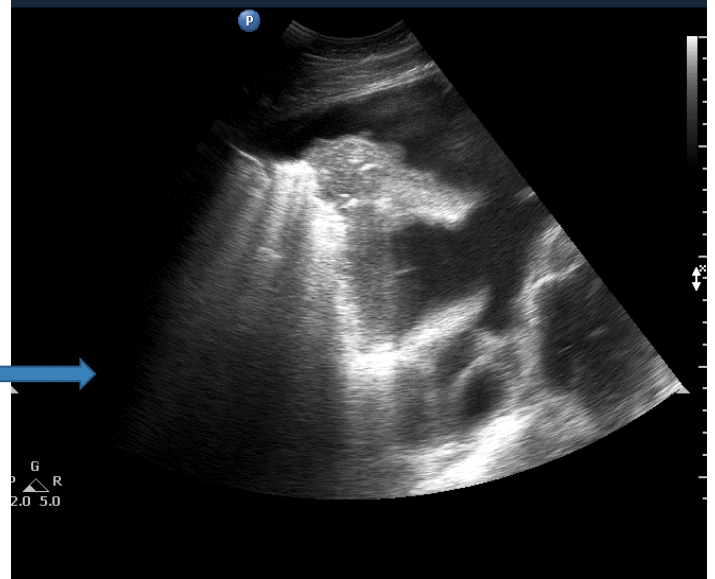
- Tachypnea and tachycardia
- Nasal or oral discharge
- Coughing



- Retching, gulping, repeated swallowing
 - **Odynophagia**-painful swallowing
 - Signs of difficulty swallowing may be delayed
 - *It takes 16 seconds to traverse length of esophagus*

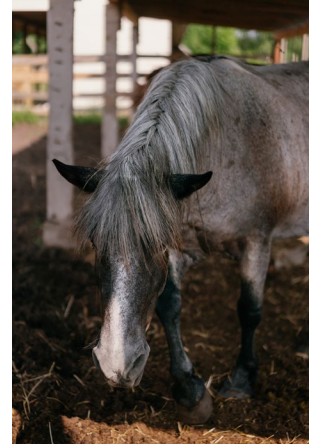
If Esophageal Obstruction is Not Treated....

- Dehydration
- Electrolyte imbalances
- Aspiration pneumonia
- Tetanus



Diagnostic Procedures

- Sedation is **imperative** to perform an examination
- Thorough oral exam should be performed
 - Foreign body
 - Dental disease
 - Cleft palate
 - Neoplasia
- External exam may note cervical swelling at site of obstruction
 - Crepitus may indicate rupture



Diagnostics: Nasogastric Intubation

- **Can be diagnostic and therapeutic**
 - 30-100 ml Lidocaine per NG can reduce spasm
 - Double lumen tubes are available
- **Common sites of obstruction**
 - Proximal esophagus
 - Thoracic inlet
- **If lavage relieves obstruction immediately, and the choke is acute, further diagnostics are often unnecessary**
 - *However, unusual clinical exam findings or recurrence warrant a more extensive exam*



Medications to Relax Esophagus

- **Acepromazine**
 - Phenothiazine tranquilizer

 - Alpha-1 antagonist

 - Most effective on smooth muscle
 - Therefore, acts on distal esophagus

 - Caution in hypovolemic animals



Medications to Relax Esophagus

- **Alpha-2 agonists**

- Relax skeletal muscle of proximal esophagus
- Detomidine most effective to improve dilation at thoracic inlet
- Xylazine and butorphanol reduce swallowing reflex
- Combination of alpha-2 agonist and an opioid agonist-antagonist show the best effects *in vivo*



Medications to Relax Esophagus

- **Oxytocin**

- Effective *in vitro*, but no effect *in vivo*
 - Meyer 2000, Wooldridge 2002

- **N-butylscopolammonium bromide (Buscopan)**

- Eliminates swallowing reflex in the distal esophagus
- Does not affect baseline esophageal pressures
 - Bertone 2011



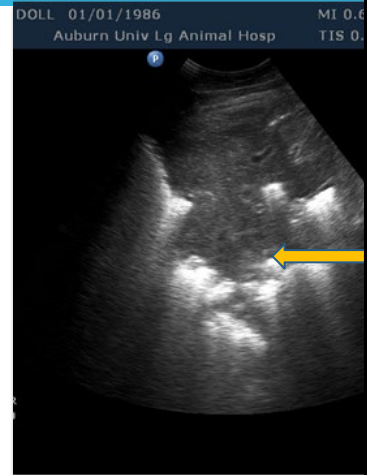
Diagnostics: Ultrasonography

- Esophageal ultrasound can identify obstruction
 - Identify rupture or cellulitis

- Thoracic ultrasonography most helpful

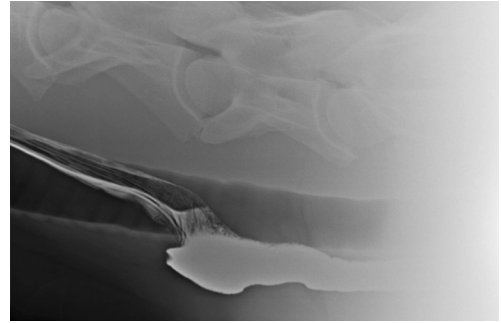
- Determine severity of aspiration
- Monitor progression or resolution
 - Most aspirated fluid will be reabsorbed by 24 hours

- Duration of obstruction- best indication of risk of pneumonia



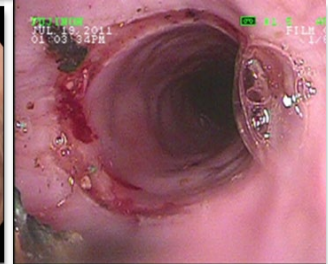
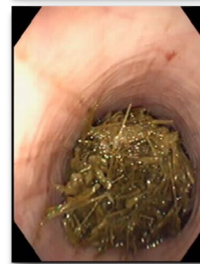
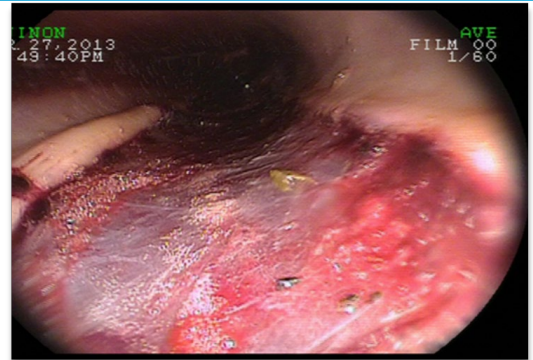
Diagnostics: Esophagography

- Useful for complicated obstructions, recurrent choke, and surgical planning
 - 120 ml 85% wt/vol barium paste PO
- Outlines obstruction
 - Flow halted by complete obstruction
 - Barium will escape with rupture
- Advanced studies using liquid barium and air contrast useful for mucosal lesions
 - Air can also be used for a negative contrast study



Diagnostics: Endoscopy

- Allows examination of lumen and mucosa
 - 200 cm or longer necessary to examine entire length of esophagus
 - *Most cranial aspect logistically difficult*
- Common findings
 - Impacted feed
 - Erosions
 - Lacerations

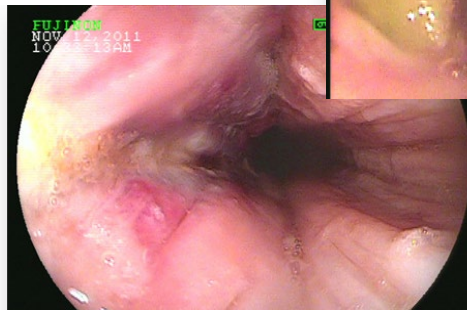
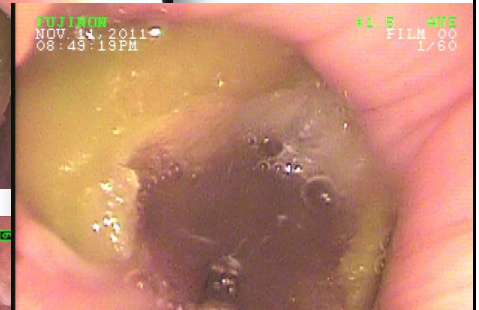
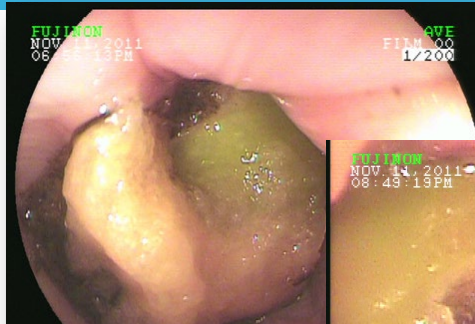


Endoscopic Dissection

- Useful for solid obstructions

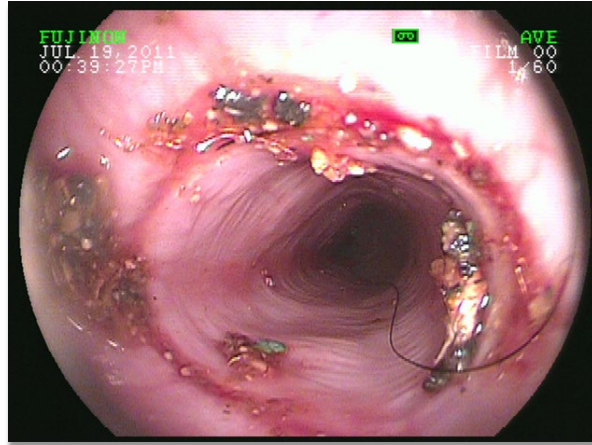
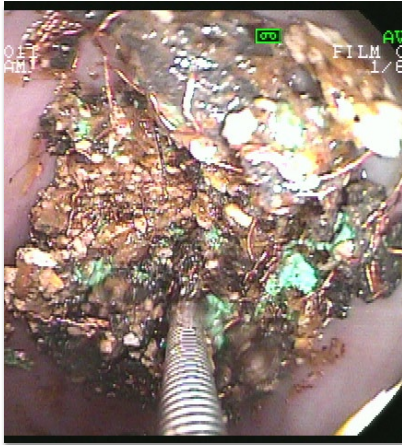


- Reduces trauma
- Time consuming



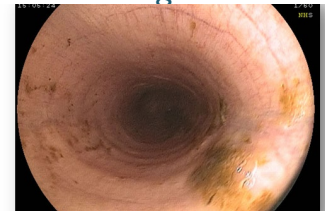
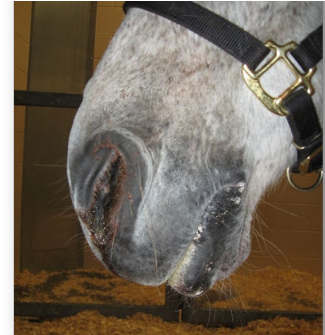
Endoscopic Dissection: Case Example

- Copper Wire Obstruction



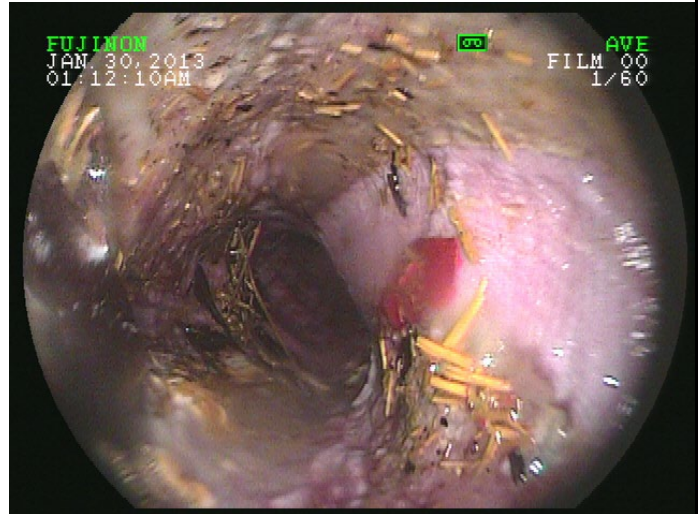
Sequalae: After resolution...

- Most cases respond to gentle lavage
- Dilation of esophagus may persist
 - Predisposes to re-obstruction for 48 hours
- Withhold feed for 1-2 days
 - Introduce small quantities of soft feed mashes
 - Feed restrictions may need to continue depending on duration and damage
- Antimicrobials indicated for 5-7 days
 - Broad spectrum
 - Tetanus toxoid



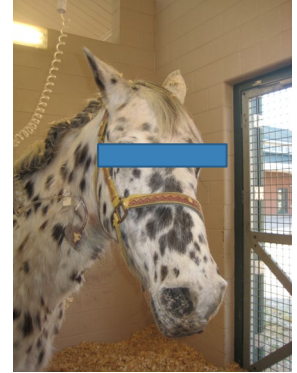
Mucosal Ulceration and Esophagitis

- May be longitudinal or circumferential
- Secondary to...
 - Impactions
 - NSAIDS in foals
 - Reflux esophagitis
- Low bulk diet and reassess in 10-14 days
 - Strictures occur in 30 days
 - Most common with ulcers more than 2.5 cm long
- Remodeling will continue for 60 days
 - 71% resolve without treatment
 - *Todhunter et al 1984*



Unresponsive Esophageal Obstruction

- Place in stall on IV fluids
 - Sedation may assist in relaxing the esophagus
 - Wait 8-12 hours and reattempt lavage
- If still unsuccessful, can anesthetize and lavage under pressure
 - Place esophageal tube prior to anesthesia



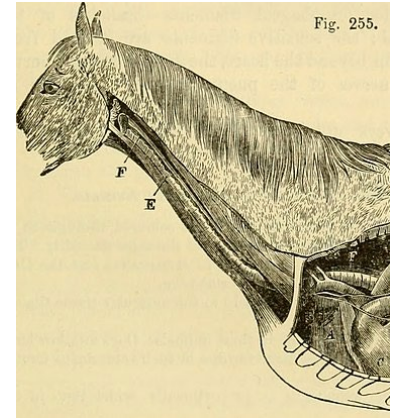
Surgical Approaches: Esophagotomy

- Useful for foreign bodies or persistent obstructions

- GA or standing sedation

- Ventral approach (allows for drainage)

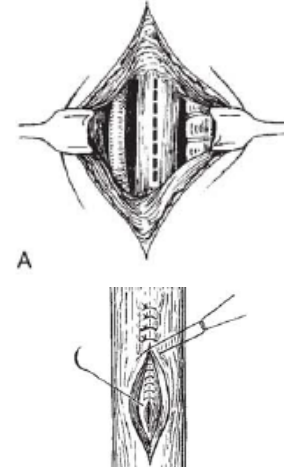
- 10 cm midline incision
- Separate sternothyroideus, sternohyoideus, and omohyoideus m.
- Blunt dissection on left side
 - Avoid vessels
 - Caution when retract left carotid sheath



- Lateral approach is also valid directly over mass/tube

Surgical Approaches: Esophagotomy

- Pediatric Balfour retractors aid in exposure
- Longitudinal incision into lumen
- Closure performed if esophagus healthy
 - Closure of mucosa with 3-0 polypropylene
 - Knots in lumen-sloughs in 60 days
 - Muscle apposed with 3-0 absorbable suture
 - Remaining muscle closed with 0 suture
- Closed suction drain placed by esophagus and maintained for 48 hours



Surgical Approaches: Esophagotomy

- **Post-operative Care**

- Withhold feed for 48 hours
- Maintain hydration with parenteral fluids
- Slurries for the following week
 - Senior pellets
 - Purina WellSolve W/G
 - 100% NRC requirements
 - Low bulk powder
 - Can be given through a tube



- *Endoscopy may provide guidance for when normal feeds can be introduced*

Ruptured Esophagus

- **Causes**

- Long-standing choke
- Aggressive nasogastric intubation
- Foreign body penetration
- External trauma

- **Clinical signs**

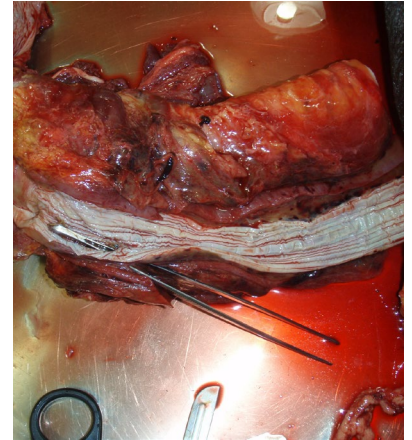
- Swelling
- Subcutaneous emphysema



Treatment of Esophageal Rupture

- **Drainage must be established**
 - Preferably ventral midline
 - Prevents mediastinitis, pleuritis and septicemia
 - Daily lavage is required

- Closure of the perforation is only possible in acute cases



Surgical Approaches: Cervical Esophagostomy

- **Allows for alimentation that bypasses pharynx and proximal disease**

- Typically placed distal to injury
- Can be placed through wound as well



- **Performed under general anesthesia or standing under sedation and local anesthesia**

- Place esophageal tube prior to surgery

Surgical Approaches: Cervical Esophagostomy

- Approach is ventrolateral in the jugular furrow
 - Avoids trachea
 - Improves access distally in neck
- Perform 5 cm incision ventral to jugular vein
- Separate sternocephalicus and brachiocephalicus m. to expose esophagus



Surgical Approaches: Cervical Esophagostomy

- Esophagus is incised longitudinally 3cm over the nasogastric tube
 - Remove tube and replace with 24 mm tube through the wound into the stomach
 - Enlarge incision if difficult to place
 - Ensure though all layers into lumen
 - Secure to skin with tape butterflys and suture



Surgical Approaches: Cervical Esophagostomy



- Keep tube in place for 7-10 days to allow granulation tissue to form a true stoma
 - Longer may be needed for ruptures or perforations

- Remove tube when wound has granulated fully if no longer needed
 - Stoma will typically heal in 3-4 weeks
 - Normal feeding by mouth can be resumed after stoma is complete
 - Feed with bucket at withers or higher to reduce losses

Surgical Approaches: Cervical Esophagostomy

- **Complications**

- *May be severe*
- Mediastinitis
- Pleuritis
- Septicemia
- Hemorrhage
- Tracheal obstruction
- Laminitis



- **Antimicrobials must continue for 7-10 days**

Esophageal Strictures

- A narrowing of the esophageal lumen
- Causes
 - Trauma
 - Surgical dehiscence
 - Compression by adjacent structures
- Types
 - Mural lesions in adventitia and muscularis layers
 - Esophageal rings involving the mucosa and submucosa
 - Annular stenosis of all layers



Conservative Management of Strictures

- “Bougienage”

- May need repeated events
- Risks rupture
- Rarely successful
 - *Prutton 2015*

- Remember...most resolve in 60 days

- Chronic strictures require surgical attention

- Mural strictures have the best prognosis
 - Esophagomyotomy

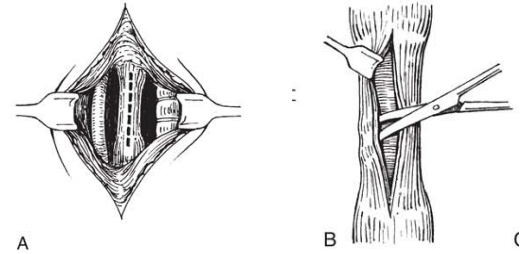


Prutton JS, Marks SL, Aleman M. Endoscopic Balloon Dilatation of Esophageal Strictures in 9 Horses. J Vet Intern Med. 2015 Jul-Aug;29(4):1105-11.

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Surgical Approaches: Esophagomyotomy

- Esophagus approached and muscle incised
 - Incision extended 1 cm proximal and distal
 - **Important: the mucosa is not entered**
- Nasogastric tube is passed distally
- Separate muscularis circumferentially
- **Muscle is not closed**
 - Approach through neck musculature and skin is sutured as previous
- Progress is followed with repeat radiographs/barium studies



Surgical Approaches: Esophagomyotomy

- **Post-operative care**

- Soft feeding for 4-6 weeks

- **Complications**

- Leakage of saliva and luminal contents
- Fistula formation
- Re-stricture
 - Conservative management often resolves new strictures
 - More complicated strictures may require resection and anastomosis, or patch grafting

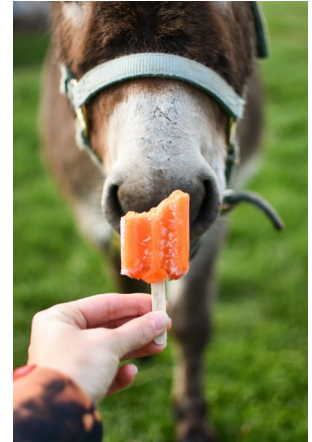


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Esophageal Diverticulum

- **TWO TYPES**

- **Traction (true) diverticulum**

- Caused by contraction of periesophageal scar tissues
- Outward tenting of all layers of the esophageal wall



True



False

- **Pulsion (false) diverticulum**

- Protrusion of muscularis and submucosa layers through a defect in muscularis

Esophageal Diverticulum

- **Causes of traction diverticulum**

- Healed esophagotomy surgery
- Surgical or traumatic wounds
- Neck abscess



- **Pulsion diverticulum may be due to external trauma**

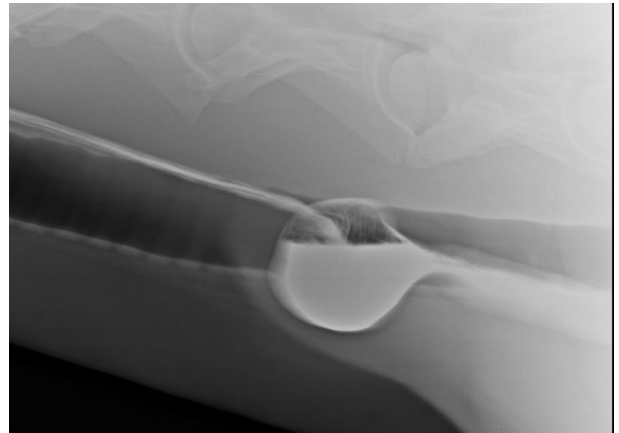
Esophageal Diverticulum

- **Diagnosis:**

 - **RADIOGRAPHS**

 - Traction diverticulum are spherical with a wide neck

 - Pulsion diverticulum are flask-like with a narrow neck



Esophageal Diverticulum

- **Diagnosis:**

 - **ESOPHAGOSCOPY**

 - Defines the size
 - Demonstrates the configuration of the opening
 - Helps to identify the type



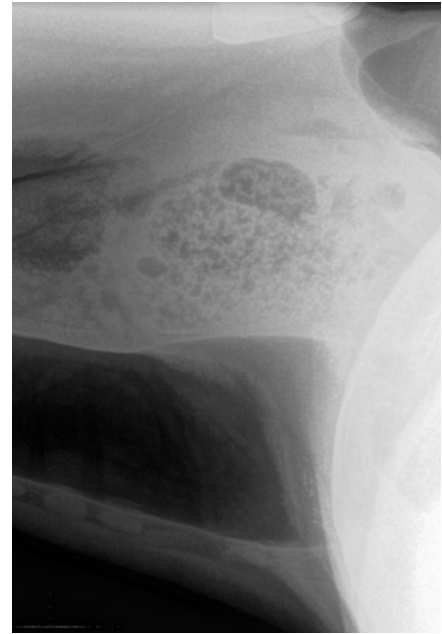
Esophageal Diverticulum

- **Clinical Differences**

- Traction diverticulum
 - rarely cause clinical signs
- Pulsion diverticulum
 - enlarge progressively and risk rupture

- **Treatment**

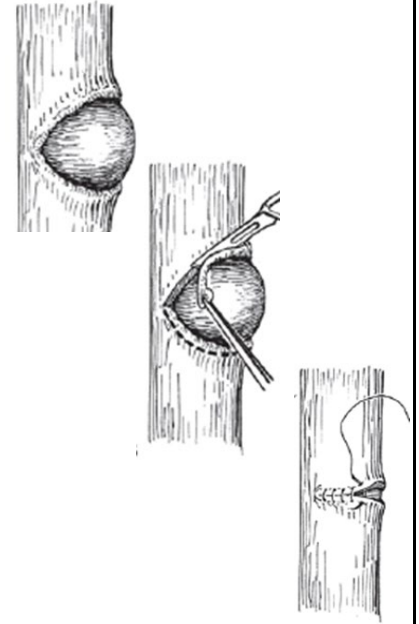
- Diverticulectomy? Not ideal
- Mucosal inversion
 - Preferred
 - Fewer complications



Surgical Approaches: Mucosal Inversion of Diverticulum

- **Expose esophagus and identify diverticulum**

- *As previously described*
- Debride muscularis m. layer to healthy tissue
- Invert mucosal sac
- Appose muscularis layer with interrupted sutures of 3-0 polypropylene



- **Post-operative care**

- Soft feeding for 4-6 weeks

General Complications of Esophageal Surgery

- **Dehiscence**
 - Closed suction drain detects salivary leakage
 - Large amounts require intervention
 - Open wound management

- **Dissecting infection (to the chest)**
- **Strictures**
- **Laryngeal hemiplegia**
- **Carotid artery rupture**



Prevention of Esophageal Obstruction

- **Feed appropriate, good quality feedstuffs**
 - Pelleted feed for seniors
 - Wet feed
 - Bite size treats specifically for horses
 - Avoid hard foods (apples, carrots)
 - Slow intake in horses that bolt feed
 - Special feeders
- **Prevent access to objects/foreign bodies**
- **Provide adequate dental care**
- **Owner education**



Summary

- Choke is the most common esophageal disorder
- Early and gentle intervention avoids complications
- Recurrent choke should be pursued with advanced diagnostics
- Most esophageal surgery is simple in technique, but complications are common



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