

**COLLEGE OF VETERINARY MEDICINE
UNIVERSITY OF AGRICULTURE ABEOKUTA**

LECTURE NOTES

COURSE TITLE: SOFT TISSUE SURGERY AND LAMENESS

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LECTURER: DR. OLUSA, T.A.O

LECTURE 12: SURGICAL CONDITIONS OF THE ESOPHAGUS AND TRACHEA

INTRODUCTION

- Surgical conditions affecting of the neck region usually manifests clinically as difficult swallowing, excessive salivation, retching and vomiting, dyspnea, pain and general discomfort to the animal.
- Some surgical conditions of the neck region (to be discussed) are primarily conditions of the oesophagus and the trachea.

REVIEW OF THE SURGICAL ANATOMY AND PHYSIOLOGY OF THE OESOPHAGUS

- The esophagus begins at the pharynx and terminates at the cardia of the stomach.
- It consist of cervical, thoracic and abdominal portions being enveloped by pleura and peritoneum in the thoracic and abdominal cavities respectively.
- No true serosa is present. It consist of four layers viz: loose areolar adventitia, two oblique layers of striated muscularis, submucosa and mucosa.
- The absence of a serosa layer in the oesophagus which is present elsewhere in the GIT is of surgical consideration because it exude a fibrin clot that creates an early “seal” following surgical incision and closure of the intestinal tract .
- Prevention of leakages following surgery thus requires meticulous technique and careful opposition of tissue.
- The submucosa has mucous glands and loosely hold the mucosa (which contribute the most to suture holding capacity) to the muscular layer.
- The role of the oesophagus is to transport food and liquid from the pharynx to the stomach: It has no absorptive or digestive functions.

I. OESOPHAGEAL FOREIGN BODIES (OFB)

INTRODUCTION:

- OFB is the ingestion of foreign bodies (most commonly bone) that becomes embedded/ lodged in the oesophagus.
- Most typical site of F.B entrapment in the esophagus are the thoracic inlet, the base of the heart and just proximal to the cardia.
- Highest incidence occurs in young dogs because of their indiscriminate eating habit however, it is also seen in any age and species of animal.
- Early detection is critical in reducing the risk of oesophageal damage or death.

OESOPHAGEAL OBSTRUCTION

- Obstruction of oesophagus in the dog and cat is usually due to foreign bodies
- Strictures and neoplasia are less common
- Obstruction may either be partial or complete

DIAGNOSIS

- A history of foreign body ingestion by the animal may or may not be provided by the owner
- The clinical sign shown by an animal with OFB depends on the degree of oesophageal obstruction., the severity of injury to the mucosa or submucosa and the presence or absence of esophagus perforation
- In partial obstruction with minimal mucosa injury, signs may be difficult to detect.
- In complete obstruction and or with longer duration; regurgitation listlessness ,drooling , disphagia and pain are classic signs to be observed.

- Cervical oesophageal perforation secondary (squeal) to obstruction may cause subcutaneous emphysema, local cellulitis, draining sinus tract(s) swelling and pain.
- Intrathoracic oesophageal perforation will result into thoracic pain and respiratory distress due to pneumothorax, pyothorax & pleuritis.
- Not all foreign bodies are radiopaque objects thus negative findings on survey radiographs do not exclude the presence of a foreign body in a dog with signs of oesophageal disease.
- Barium sulphate suspension (meal) may be used for oesophagram (contrast radiograph)./ organic iodide -- gastrograffin
- Endoscopic examination which allows direct visualization of the foreign body is a method of choice for determining the location of a foreign body, the degree of oesophageal damage and the most appropriate method of removal.

MANAGEMENT

- Management of OFB/Obstruction could be non surgical or surgical.
- Non-surgical removal of OFB should be attempted before surgical intervention except where there is evidence of oesophageal perforation.
- Many instruments can be used to manipulate OFB but the choice of instrument should be based on the size and shape of the foreign body.
- Rigid tube endoscope or fiber optic endoscope can be used.

SURGICAL MANAGEMENT: OESOPHAGOTOMY

- Depending on the location of the OFB, the site of oesophagotomy can be cervical, thoracic or abdominal.

➤ **CERVICAL OESOPHAGOTOMY**

- Place the dog on dorsal recumbency under general anaesthesia and prepare the ventral cervical region aseptically for surgery (i.e. clip/shave hair, scrub and drape).
- Make a ventral midline incision through the skin and subcutaneous tissue (judge the length by the size of the f. b).
- Bluntly separate the sternolyoideus muscles on their midline and retract laterally to expose the trachea which is held to the right (Exercise great care to avoid injury to the adjacent carotid sheath and left recurrent laryngeal nerve). This allows you access to the oesophagus which lies to the left of the midline in the neck.
- Isolate and pack off the oesophagus with moistened laparotomy sponges to minimize contamination and insert a large-bore tube per os to aspirate oesophageal content, immobilize it and serve as a “cutting board” to protect the deeper layer during incision.
- Make a longitudinal incision in a healthy portion of the oesophagus near (caudal) or over the foreign body.
- Grasp the f.b with appropriate forceps/instrument, gently manipulate and remove.
- After removal of the insulting f.b, lavage the tissue with sterile saline and inspect for viability.
- Close the oesophagus in 2 layers; the mucosa and submucosa with simple interrupted sutures with knots tied within the lumen using 3 –0 absorbable synthetic material (e.g polydioxanone) while the muscularis is closed with same material and pattern.
- Test for patency after closure by dilating the oesophagus with saline and observe for leakage.
- Close the skin and subcutaneous incision routinely using simple interrupted suture with 2-0 Nylon.

➤ **THORACIC OESOPHAGOTOMY**

- The cranial and caudal thoracic oesophagus can be approached through either a left or right lateral intercostals thoracotomy.
- The location of the f.b, as seen on a lateral thoracic radiography will determine the intercostal space to be used.
- Perform thoracotomy (to be discussed later).
- Follow every steps highlighted for cervical oesophagotomy.

POST – OPERATIVE CARE

- Withdraws food and water for 48 hours.
- Maintain the patient on intravenous fluids (Balanced electrolyte; Dextrose Saline solution, lactated Ringers etc). until oral intake is adequate.
- Gradually return diet to normal between 7-10 days
- Use antibiotics with discretion

COMPLICATION AND MANAGEMENT

- Aspiration pneumonia due to oesophageal obstruction ; and repeated regurgitation of food and saliva. Removal of d f.b and appropriate correction of the perforation or diverticulum created by the f.b during surgery correct this.

II. MEGA – OESOPHAGUS

DEFINITION/ INTRODUCTION

- A dilated oesophagus of any cause.
- The dilatation can be secondary to neuro-muscular dysfunction or obstruction from neoplasia, structure or external composition.
- Primary megaesophagus (Idiopathic, congenital) and Acquired form do exist.
- The term megaoesophagus describe more appropriately, a syndrome in which the esophagus is dilated and hypomotile due to neuromuscular dysfunctions.

- The little or no oesophageal peristalsis results in retention of ingesta in the oesophagus and thus esophageal distension.
- Aspiration pneumonia is a common sequela to regurgitations and often may be the cause of death or euthanasia.

HISTORY, CLINICAL SIGNS AND DIAGNOSIS

- Clinical signs usually begins during puppyhood (Around 10 weeks when pup is weaned to solid food) but several reports have suggested that some 30-60% of dogs are adult when the condition is diagnosed.
- Regurgitation of undigested food or water (oral or nasal) is the most common clinical sign which may occur immediately after eating or may be delayed up to 24 hours.
- M.O affects most breeds of dogs but Great danes, Irish setters and German shepherds are at high risk
- Other/signs include:
 - Normal or ravenous appetite but poor weight gain,
 - Distension of the cervical esophagus (more pronounced when the dog coughs or when the chest is compressed),
 - Mucopurulent nasal discharge,
 - Coughing, dyspnea and poor hair coat.
- Diagnosis is suggested/aided with the presenting complaint of chronic vomiting as usually perceived by the owner.
 - Vomition is a reflex mediated via the brain stem and often associated with hypersalivation, frequent swallowing and vigorous abdominal contraction while.
 - Regurgitation is a passive process by which retained ingesta is expelled secondary to intrathoracic pressure.
- Upper Barium series and fluoroscopy should confirm diagnosis.
- Searching for an underlying disorder is recommended because correcting the underlying problem may allow oesophageal signs to go.
- **Some Primary disorders associated with megaesophagus in dog are:**
 - Myasthenia gravis
 - Polyneuritis
 - Polymyositis
 - Giant axonal neuropathy
 - Ganglioradiculitis
 - Botulism
 - Systemic lupus erythematosus
 - Familial canine dermatomyositis
 - Glycogen storage disease type II
 - Bronchiesiophageal fistula
 - Spinal muscle atrophy
 - Polyadycloneuritis

- Lead poisoning
- Medullary disease – Canine distemper, truma, neoplasia.

➤ **Some Causes of Regurgitation**

- Megaesophagus (i.e congenital/ idiopathic or secondary)
- Esophagistis
 - Oesoph. Stricture
- Vascular ring anomaly
 - Neophasia
- Foreign body
 - Regional motility disorder
- Extra oesoph. Compression
 - Granuloma
- Diverticula
 - Gastroesophageal intussusception
- Hiatal hernia.

TREATMENT

- Feeding of small amount of food to the animal from an elevated platform.
- Cardiomyotomy: reduction of functional obstruction associated with hypo motility of the oesophagus, asynchrony of the peristaltic wave in d caudal oesophagus and opening of the gastroesophageal sphincter GES. The goal of cardiomyotomy is to allow the oesoph to empty more easily however, **it does not resolve all cases of megaesoph.**

III. VASCULAR RING ANOMALIES (VRA)

INTRODUCTION

- It is a congenial heart problem or defect.
- The oesophagus is entrapped by the abnormal position of the persistent right fourth aortic arch.
- There is gradual dilatation of the oesophagus proximal to the obstruction as food accumulates, leading to eventual regurgitation and peristalsis disruption.
- Persist right aortic Arch (PRAA) is the most predominant form of vascular ring anomalies. Other forms are: Persistent patent ductus arteriosus PPDA; Pulmonary stenosis PS;
- VRA can occur in any breed but most prevalent in German shepherds and Irish setters. No sex prdilection has been demonstrated.

HISTORY, CLINICAL SIGNS AND DIAGNOSIS

- Early signs are seen between 4 & 8 weeks when weaning pups to solid food. And the presenting sign is of persistent regurgitation shortly after eating, usually within 1 hour.
- Affected animals are underweight, have good/ravenous appetite but demonstrate poor growth; often emaciated and cachectic.
- There are some degree of cervical ballooning (or distension) especially during cough
- There is chronic coughing due to aspiration pneumonia which is a possible sequela to death in this condition.
- Diagnosis is based on history, designs, physical examination, radiography, oesophagoscopy and fluoroscopy.
 - Plain radiograph of the thorax reveals an enlarged, air – filled and fluid-filled oesophagus cranial to the heart with some ventral displacement of the heart.
 - Contrast oesophagram demonstrates precardia saccular dilation of the oesophagus that narrows at the base of the heart
 - Fluoroscopy done prior to surgery could assist to evaluate oesophageal motility both cranial and caudal to the constricted portion.

MANAGEMENT

- Institute an aggressive supportive medical therapy before surgery aimed at correctly dehydration and nutritional deficits (these may last several days; up to 2 wks)
- Treat co-existing aspiration pneumonia with antibiotics.

SURGICAL PROCEDURE

(Anaesthetic requirement is general inhalational anesthesia e.g. Oxygen / halothane).

- In PRAA, the oesophagus is trapped between the aorta, the main stem of pulmonary artery and the ligamentum arteriosum LA (thus surgical intervention is based on severing the LA and associated fibrous constricting bands).
- Perform a left-sided thoracotomy through the fourth intercostals space. (This allows good access to the LA and the oesophagus)
 - Gently retract the left apical lung lobe with care to break down the mediastinal pleura to reveal the vascular ring, which can be identified at the posterior end of the oesophageal dilatation (be very careful lest you damage the adjacent thoracic ducts).
 - Bluntly dissect free the LA from the oesophagus and ligate it with 2 suture of 3-0 silk close to its aortic and pulmonary artery connections. Follow this with transection.
 - Further free the oesophagus by blunt dissection of the mediastinum and adventitia for a distance of 1-2cm above and below the constricted portion beneath the ligamentum.
 - Dilate the oesophagus by inserting a large Foley catheter or balloon dilator into it per os and pass it down to the site of constriction. (This ensures that the site of obstruction is well dilated to forestall recurrence of clinical signs due to structure).
 - Reposition the left apical lobe of the lung and close the thoracotomy incision routinely (This will be discussed later).

POST OPERATIVE CARE

- Provide water ad libitum and feed on bland diet/meal 3-4 times daily for 48 hours.
- Restore normal diet over a period of 7 – 10 days
- Feed animal on standing position of the hindlimbs from an elevated platform.

POSSIBLE COMPLICATION

- Regurgitation may re-occur because of stenosis at the surgery site or formation of extraluminal scar tissue.

- Thus ensure adequate transection of fibrous band and balloon dilatation of the site.
- Beware of aspiration pneumonia!

IV. OESOPHAGEAL DIVERTICULUM (OD)

DEFINITION/INTRODUCTION

- Circumscribed pouch or sac of variable size created by herniation of the mucosal lining through a defect in the muscular coat of the oesophagus.
- It generally occurs in dog either cranial to the thoracic inlet or most often cranial to the diaphragm (epipheric diverticulum)
- It may be congenital or acquired; pulsion or traction type.
- OD is often associated with other lesions of the oesophagus or diaphragm (e.g. hiatal hernia, chronic oesophagitis, ulceration, and stricture).
- The thin wall of the O.D may become ulcerated, weaken and rupture resulting in mediastinitis.
- Motor function (i.e. peristalsis) remains normal unlike in megaesophagus.
- Aspiration pneumonia may be a sequela.

HISTORY, CLINICAL SIGNS AND DIAGNOSIS

- Client report a history of progressive dysphagia, regurgitation, coughing and weight loss in prolong cases.
- Contrast oesophagram demonstrates out-pouching and sacculation of the oesophagus.

MANAGEMENT

- Perform a left thoracotomy through the eight intercostals approach.
- Identify the oesophagus and isolate the diverticulum by blunt dissection down to its base.

- Place a non-crushing clamp across the diverticulum at its base and excise below the clamp.
- Close the oesophagus in an open, two-layer technique (as discussed during oesophagotomy).
- Place a chest tube for drainage and close the thoracotomy incision routinely (to be discussed later during thoracotomy lecture).

POST-OPERATIVE CARE AND POSSIBLE COMPLICATIONS

As for cervical oesophagotomy

V. A LIST OF OTHER SURGICAL CONDITION OF THE OESOPHAGUS

- OESOPHAGEAL STRICTURE/STENOSIS
- OESOPHAGEAL NEOPLASIA
- OESOPHAGEAL PERFORATION
- OESOPHAGOBRONCHIAL - TRACHEOBRONCHIAL FISTULA

VI. SURGICAL CONDITIONS OF THE TRACHEA

REVIEW OF SURGICAL ANATOMY AND PHYSIOLOGY OF THE TRACHEA.

- The larynx, trachea and lungs have a common embryonal origin in a ventral outgrowth from the foregut.
- The trachea is a flexible, ciliated, cartilaginous, and columnar epithelial membranous tube that extends from the outlet of the larynx at the level of the second cervical (C2) to the bifurcation into the two principal bronchi at the level of the 4th to 6th intercostal space.
- It can be divided into cervical and thoracic segments.
- Blood supply to the trachea is segmented and arises from a number of major vessels in the cervical region and mediastinum.
- The structures that comprise the carotid sheath (i.e. common carotid artery, internal jugular vein, vagosympathetic trunk and recurrent

laryngeal nerve) lies alongside the trachea on the dorsolateral aspect in the cranial half of the neck and lateral aspect in the caudal half.

- Exercise great care when mobilizing the cervical region so as to avoid damage to the carotid sheath structures.

I. TRACHEAL COLLAPSE (T.C)

DEFINITION

- A disorder of the trachealis muscle or rings that result in a functional tracheal stenosis
- It is mostly observed in toy and miniature(e.g Toy poodle, Yorkshire terries, Chihuahua and Pomeranian)
- The actual cause is unknown (although trauma may be indicative)
- The tracheal muscle the annular ligaments becomes weakened and flaccid and this allows flattening and narrowing of the lumen in a dorsoventral direction due to the elastic nature of the rings.

HISTORY, CLINICAL SIGNS AND DIAGNOSIS

- History of chronic cough and respiratory distress exacerbated by stress is the major complaint by the client.
- Physical examination; (palpation of the tracheal) initiate coughing and respiratory embarrassment.
- Radiograph and fluoroscopy can be used to confirm the condition.
- Plash lateral cervical and thoracic radiograph often reveals that the most frequent sites of collapse are the caudal cervical and cranial thoracic areas of the trachea.

MANAGEMENT

- Patient with less severe disease and collapse of minimal anatomic extent are managed by a combination of tracheal ring chondrotomy and plication of the tracheal muscle.
- More severe cases with extensive lesions (collapse) are better managed using an extraluminal prosthetic device.

II. TRACHEAL FOREIGN BODIES

- Rare in dog and cats.
- Usually aspirated while animal is playing or running or as regurgitus.
- Clinical signs include choking, coughing, retching and vomiting depending on the degree of obstruction.
- Diagnosis is through radiography and endoscopy.
- Management is through endoscopy and long retrieval forceps or tracheotomy.

III. TRAUMA

- Cervical bite wound are the most common cause of trauma to the trachea.
- Blunt trauma or penetrating injuries may also results into laceration or tracheal avulsion.
- Clinical signs include: non-productive cough, hemotysis, dyspnea and cyanosis.
- Rupture of the thoracic trachea or bronchi causes progressive tension pneumothorax, resulting in severe dyspnea and cyanosis.
- **DIAGNOSIS:** based on history, clinical sings and physical examination Radiography and endoscopy can be used to localize and determine the severity of the lesion.

- MANAGEMENT may involve emergency administration of oxygen and treatment for shock (when present).
- Tracheostomy may be indicated for endotracheal intubation if dyspnea and cyanosis are severe.
- Tension pneumothorax can be managed by inserting a chest tube continuous suction system.
- Correct laceration, small wounds and defects surgically.

IV. LIST OF OTHER SURGICAL TRACHEA CONDITION INCLUDES

- TRACHEAL NEOPLASM
- TRACHEA STRICTURE/STENOSIS