



# Persistent Right Aortic Arch and Vascular Anomalies

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# PRAA



- ◆ Failure of fetal vessels to regress
- ◆ Right 4<sup>th</sup> aortic arch is retained and the ligamentum arteriosum encircles esophagus resulting in extraluminal constriction

# Aortic Arch Embryology

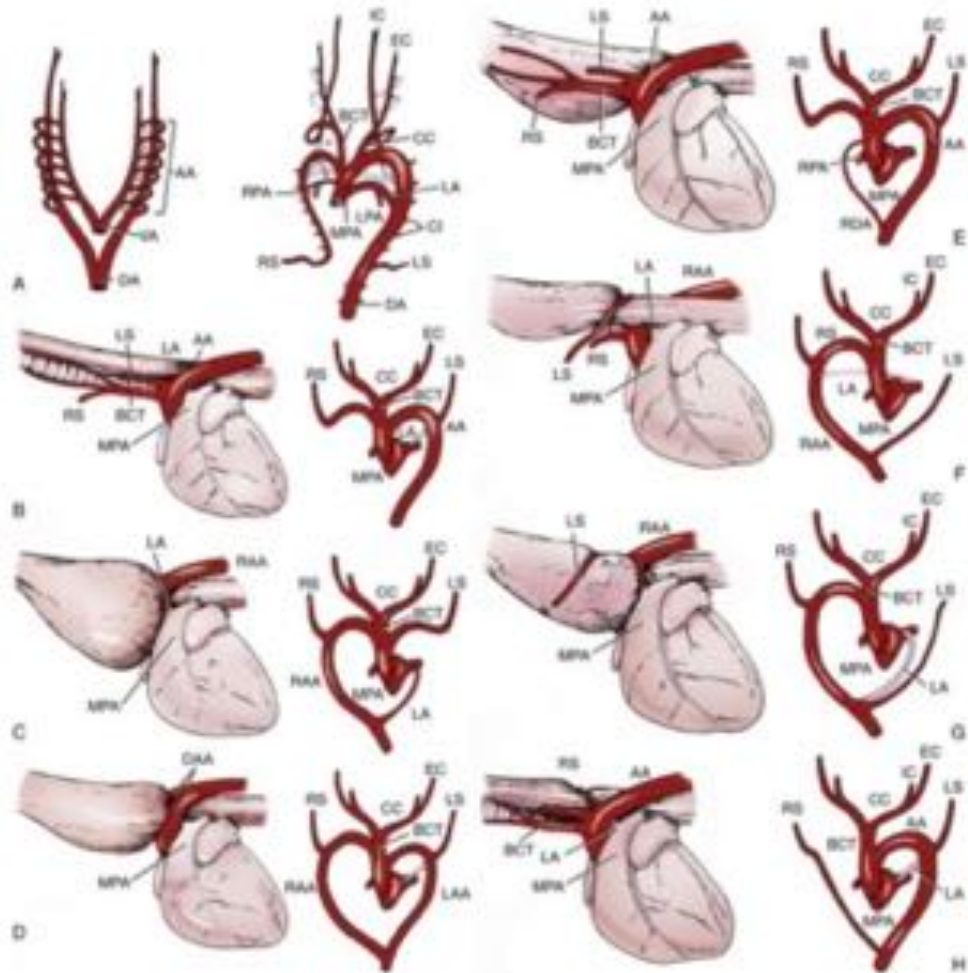


- 💧 <https://www.youtube.com/watch?v=OxuZRv7HqKg&t=6s>
- 💧 Here is a brief summary of fetal aortic arch embryology
- 💧 Reference is fully recognized as above

# Concomitant Vascular Anomalies

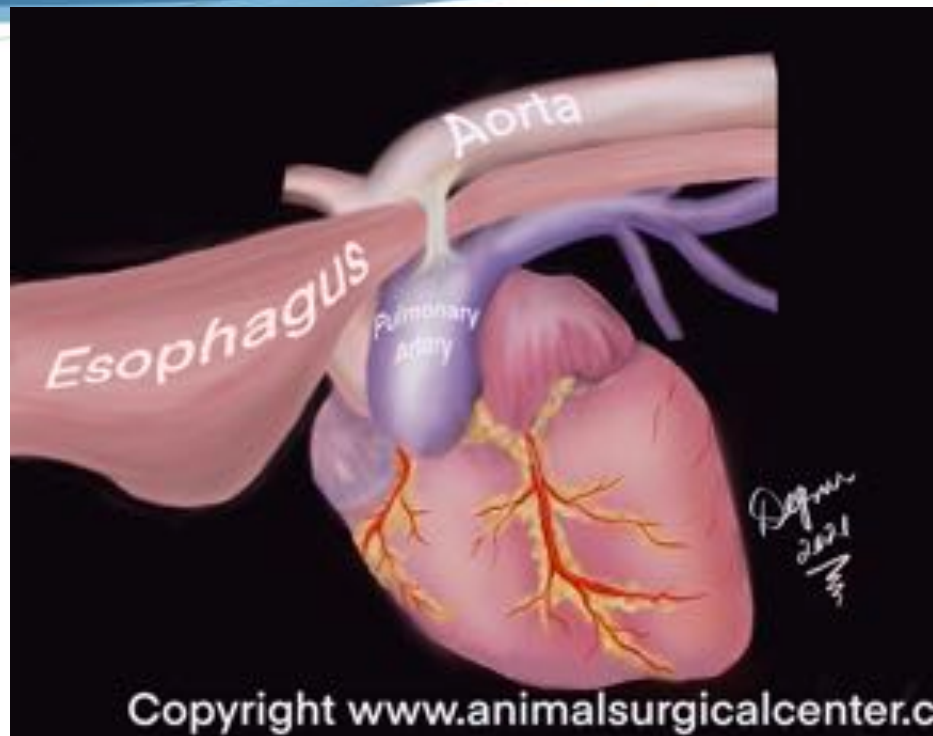


- ◆ Dexter aorta with ligamentum arteriosum – 95% of cases
- ◆ Double aorta – very difficult to treat and frequently encircles trachea and esophagus – uncommon
- ◆ Aberrant left subclavian – relatively common in our practice
- ◆ Aberrant right subclavian - uncommon
- ◆ Aberrant left azygous – joins venous sinus or persistent left vena cava
- ◆ Aberrant left cranial vena cava



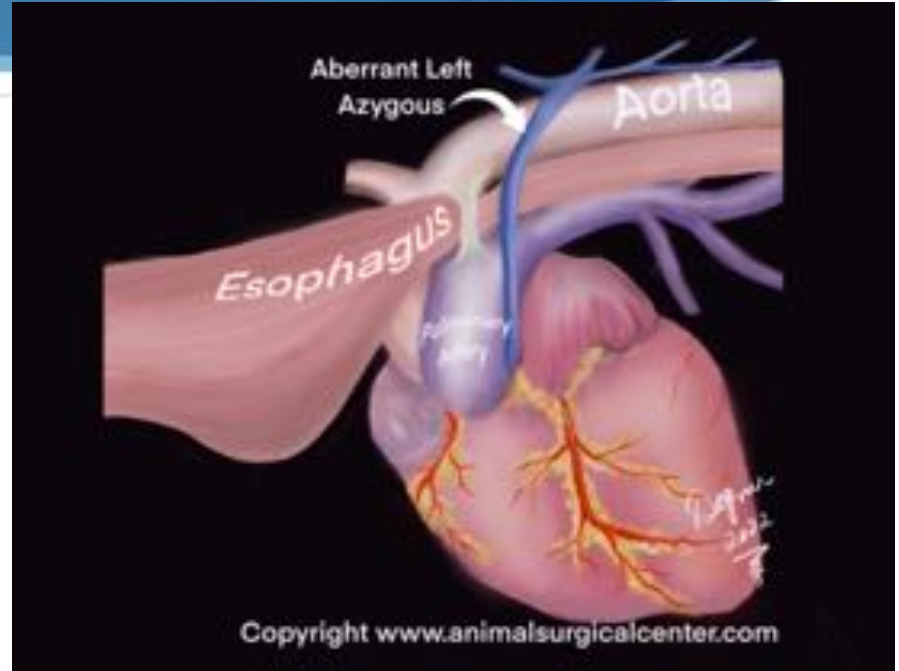
Ellison GW:  
Vascular ring  
anomalies in the  
dog and cat.  
Compend Contin  
Educ Pract Vet  
2:693, 1980.

# PRAA

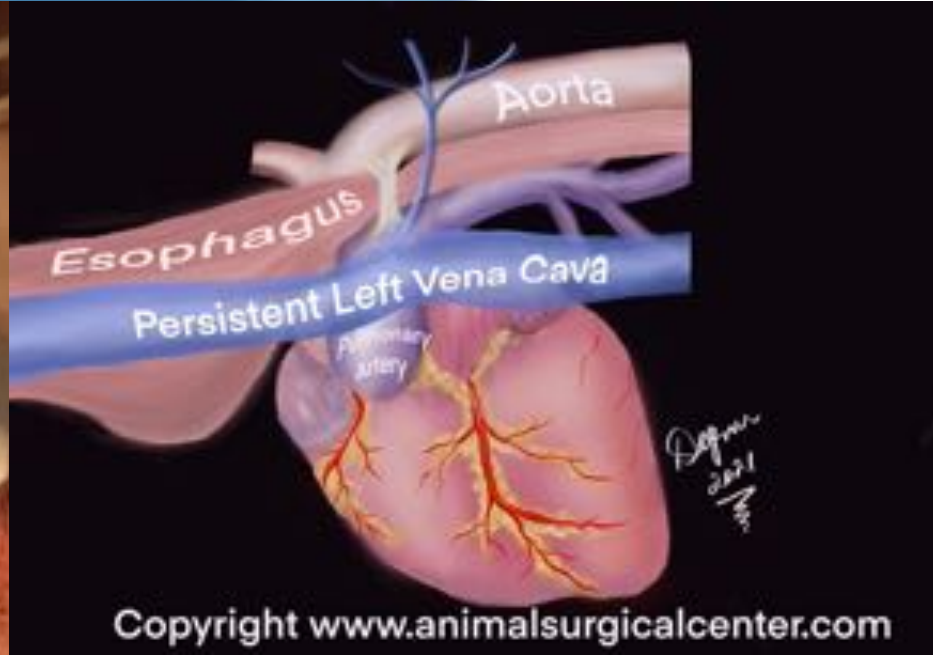
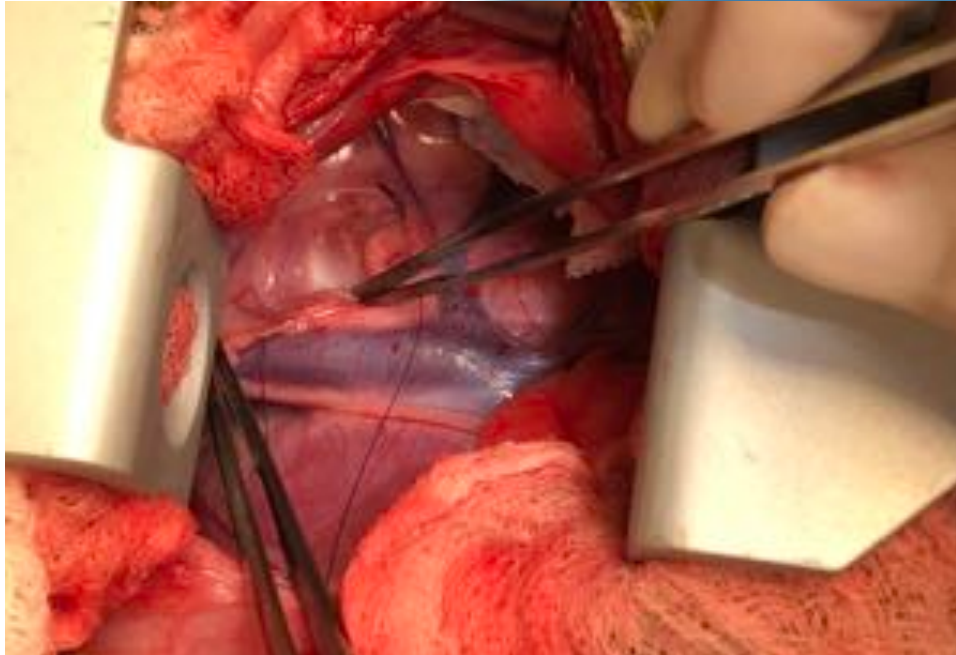




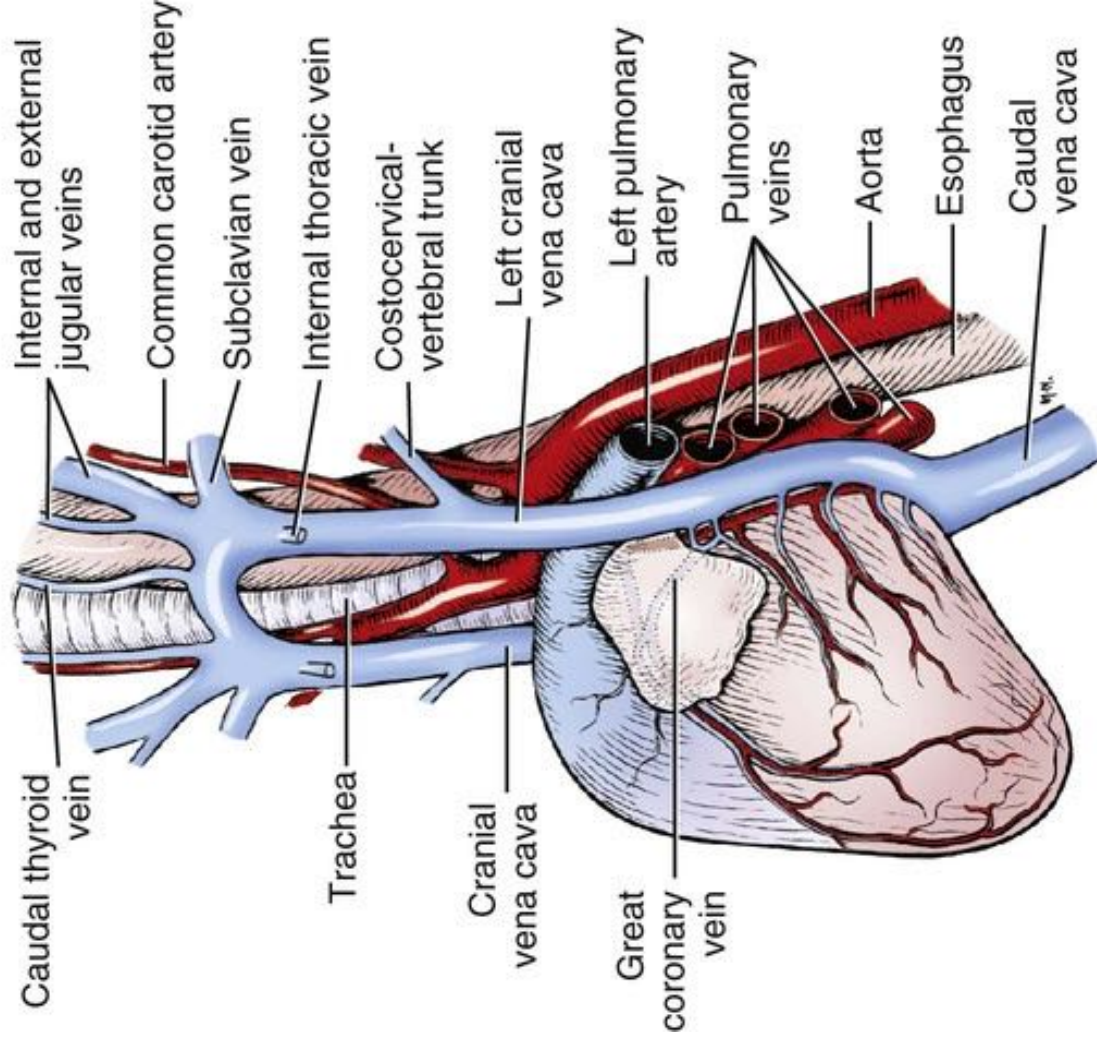
# PRAA with Left Azygous

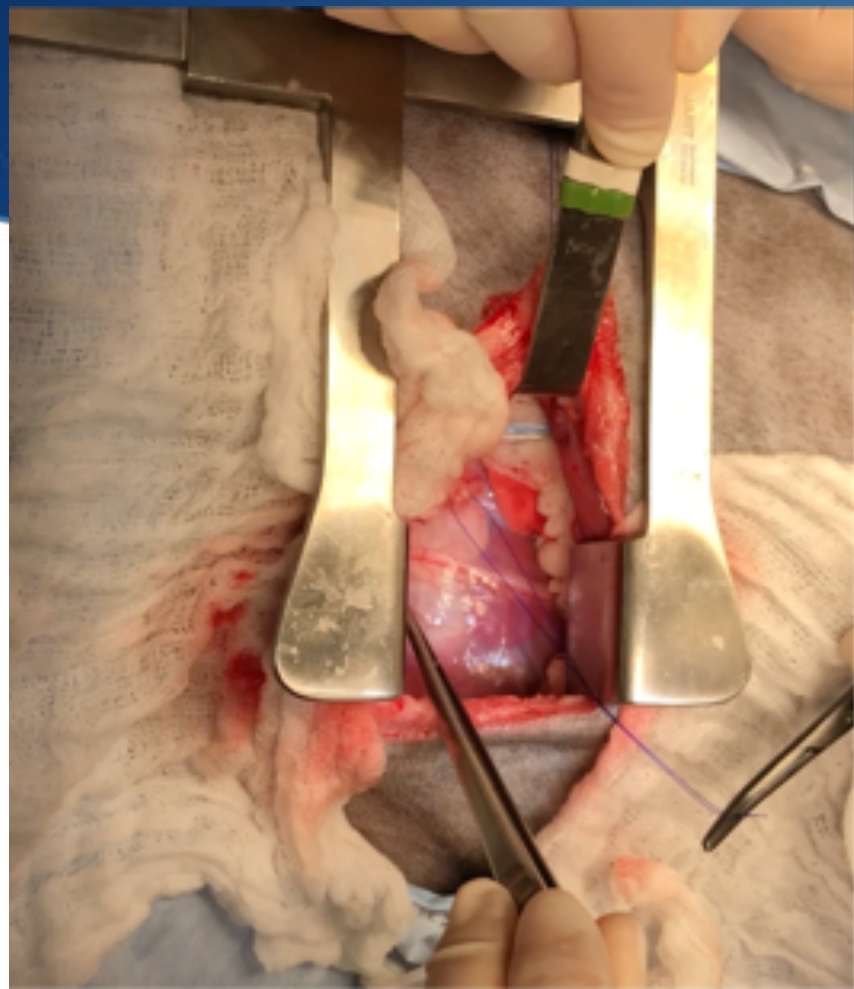


# PRAA, Aberrant Left Vena Cava & Left Azygous

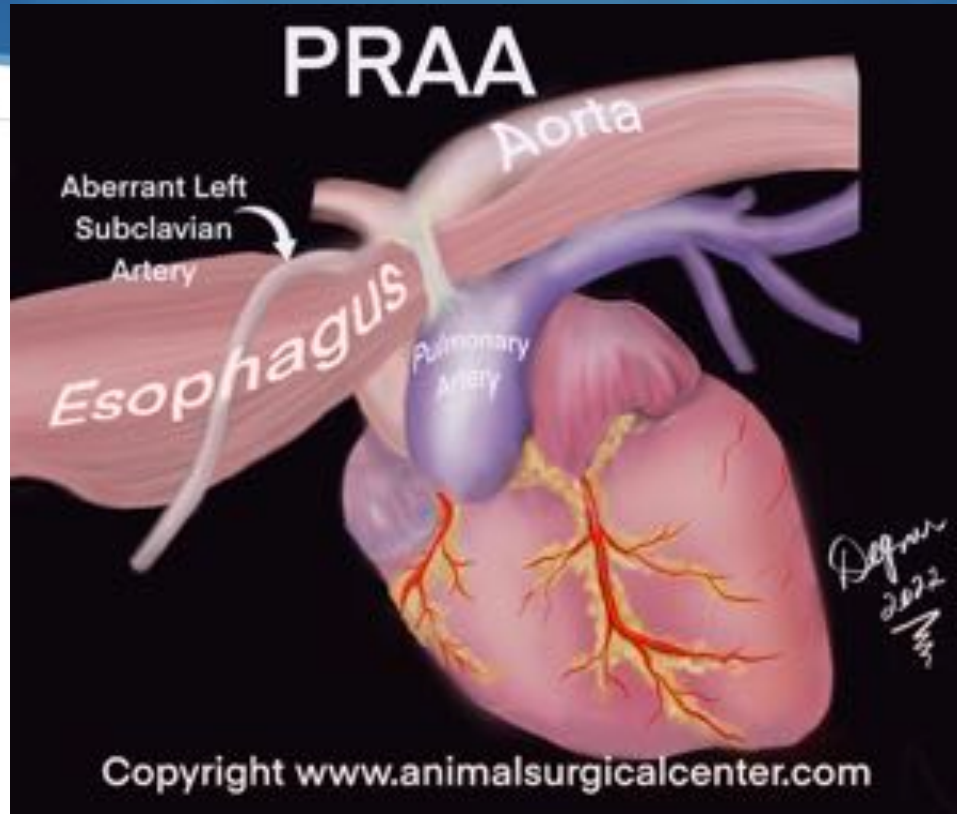




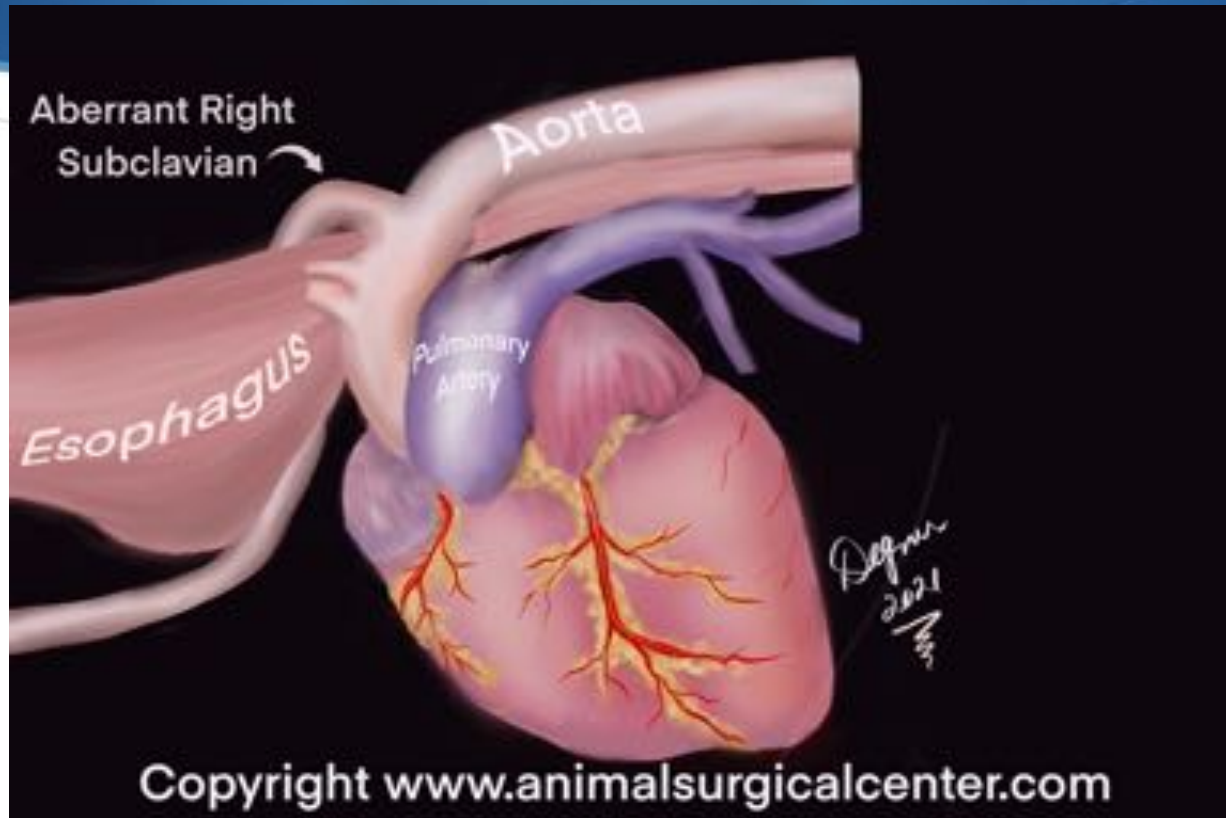




# PRAA with Aberrant Left Subclavian Artery



# Aberrant Right Subclavian Artery





# Clinical Signs



- ◆ Regurgitation usually starts once solid food fed – regurgitate food shortly after eating
- ◆ Cervical region becomes distended with eating (like a bird crop; bull frog)
- ◆ Gurgling noise when eating
- ◆ Coughing – pneumonia
- ◆ Respiratory distress if with double aortic arch
- ◆ Poor weight gain; small puppy

# Signalment



- ◆ Favors large breed dogs - German Shepherds and Irish Setters
- ◆ Cats – Persians and Siamese
- ◆ No sex predilection
- ◆ Familial tendencies – likely genetic



# Diagnostics



- ◆ Plain radiographs
  - ◆ Pneumonia check
  - ◆ Soft tissue mass in cranial mediastinum
- ◆ Barium swallow
  - ◆ Confirms esophageal constriction in front of the heart
- ◆ CT scan
- ◆ Minimum data base – CBC, chemistry, (+/- urinalysis)

# Maya – German Shepherd, 11 months, FS

Animal Surgical  
Center of MI



# Cooper Keller, 7 month old, m, Border Collie



# Cooper



# Yeti



11/30/21 12:14 PM  
Thorax  
Tbx - DV  
11/30/2021 12:12 11

Patient: NEW PUPPY  
Patient: Susan  
2 months  
Male  
Patient ID: (11159)  
POWERSVILLE, VICTORIA





# Gilliland – PRAA



# Contrast CT Scan

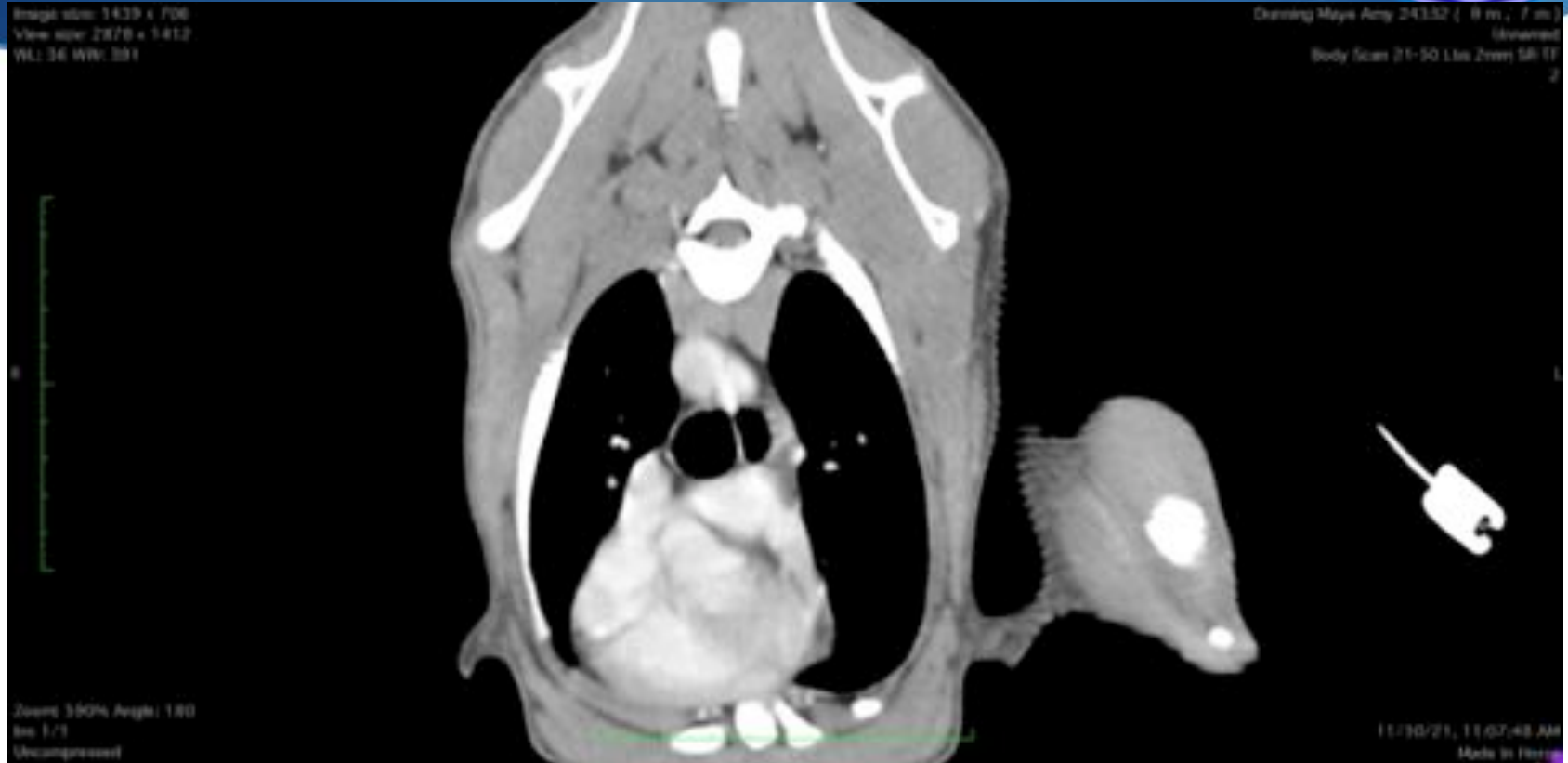


- ◆ Ventral recumbency
- ◆ Place 10F red rubber in cervical esophagus
- ◆ Place Vetrap around neck, cranial to tip of catheter
- ◆ Immediately before injection of contrast inflate esophagus with air
  - ◆ Small dog 50 ml
  - ◆ Medium dog 150 ml
  - ◆ Large dog 300 ml
  - ◆ Leave syringe attached
- ◆ Iohexal dose IV – 2 ml/kg
- ◆ Acquire CT scan 10 seconds after initiating contrast injection (arterial phase)

# Normal



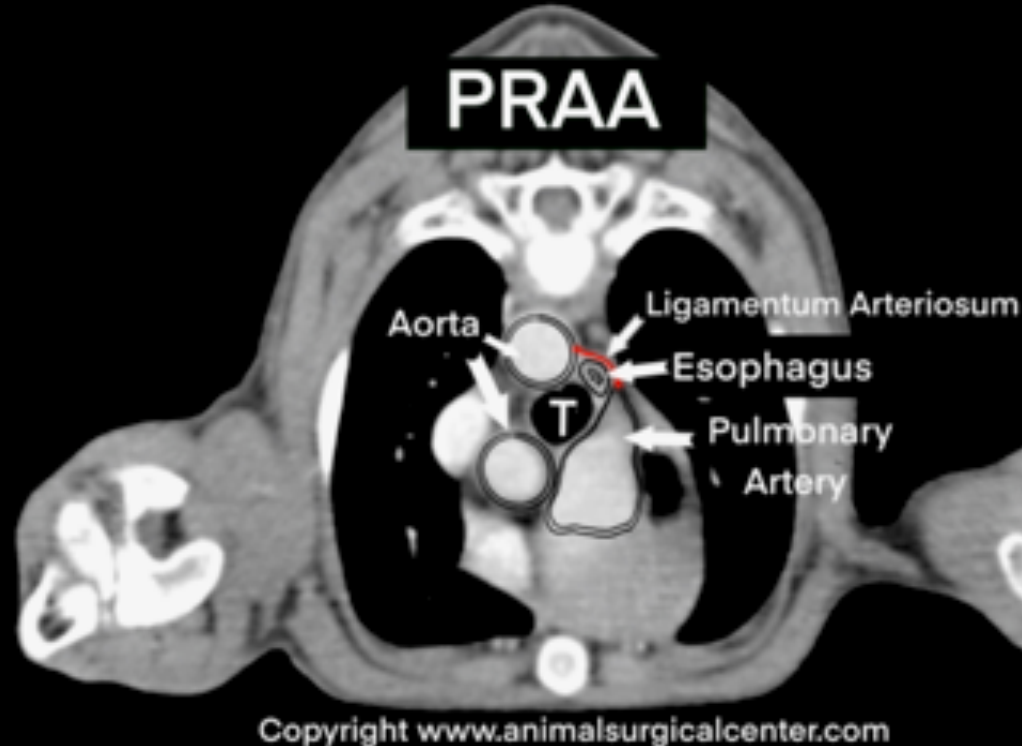
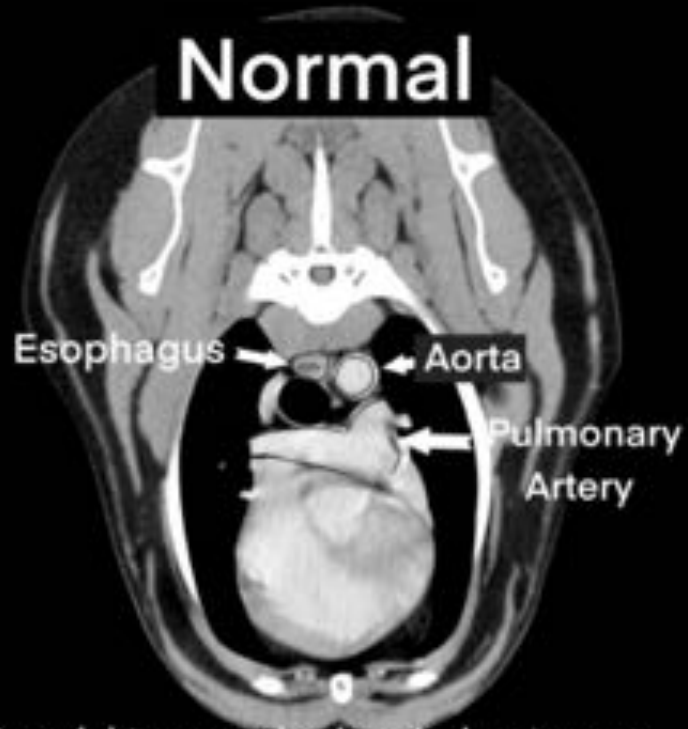
# PRAA



# Video of CT Scan

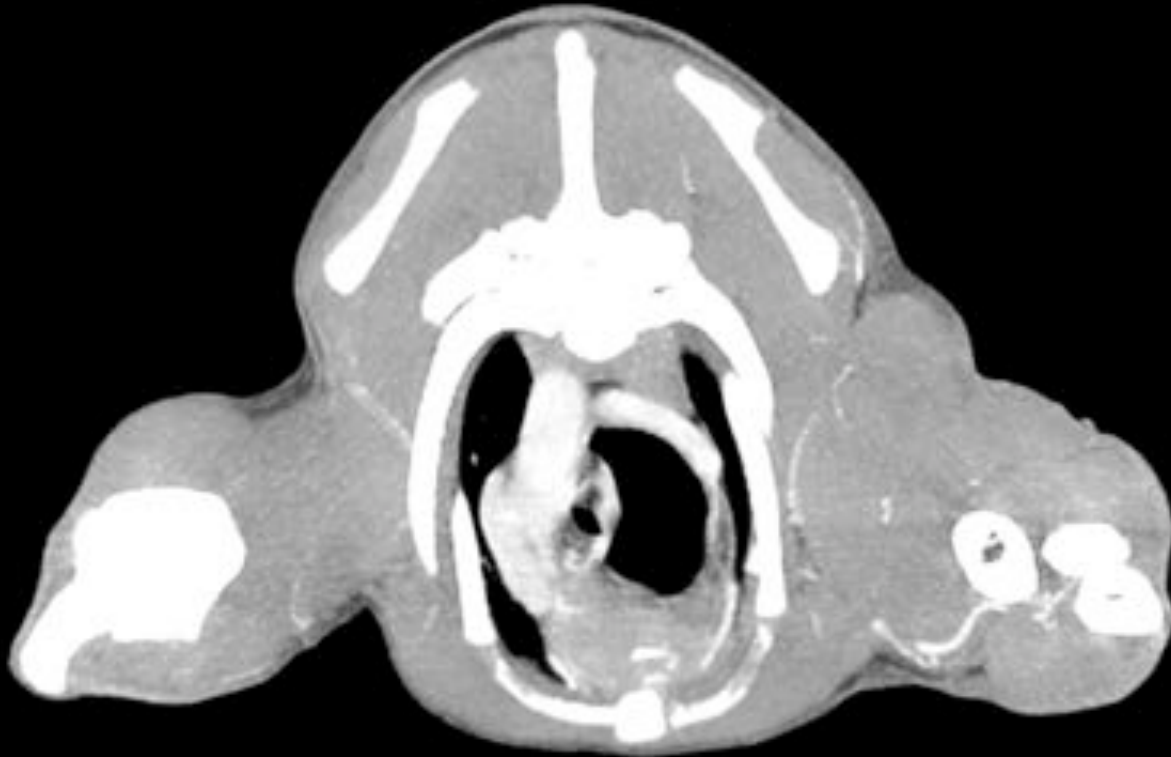


# CT Scan - Anatomy

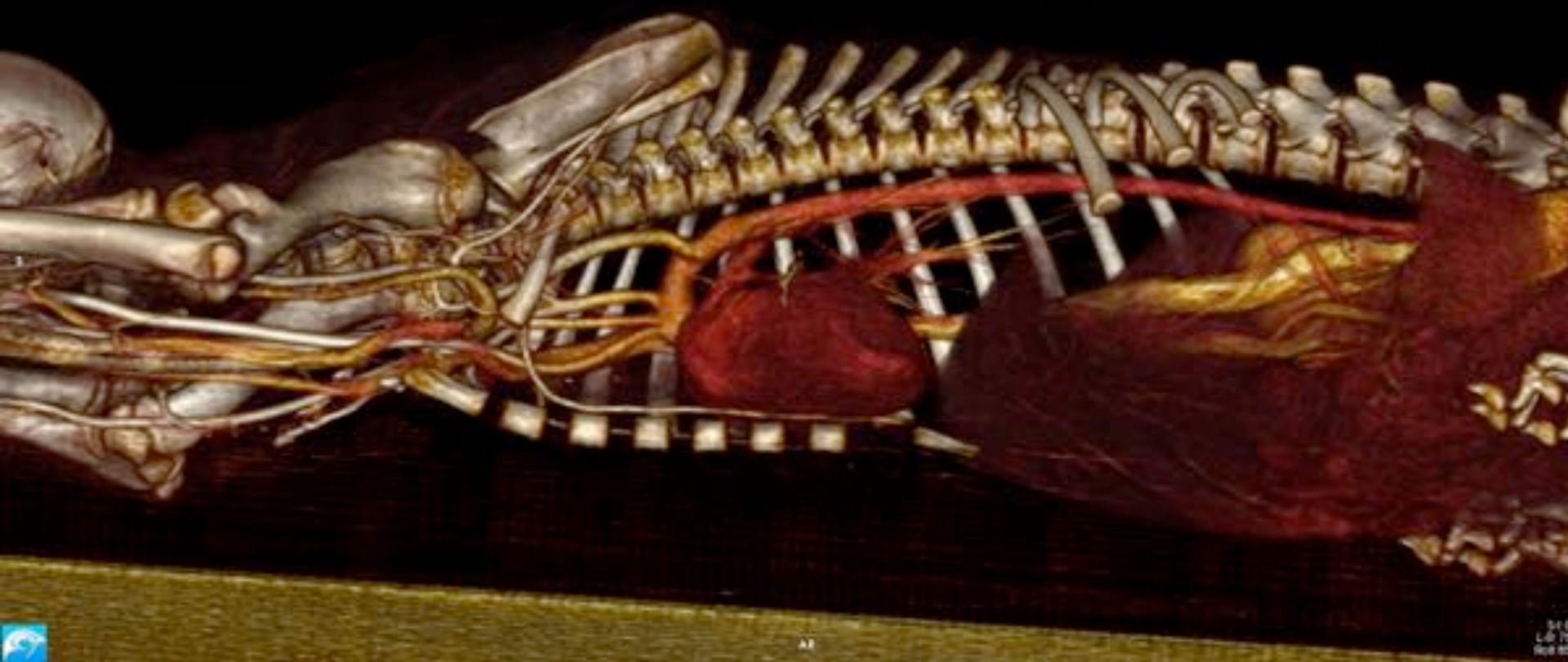




# Abberant Left Subclavian





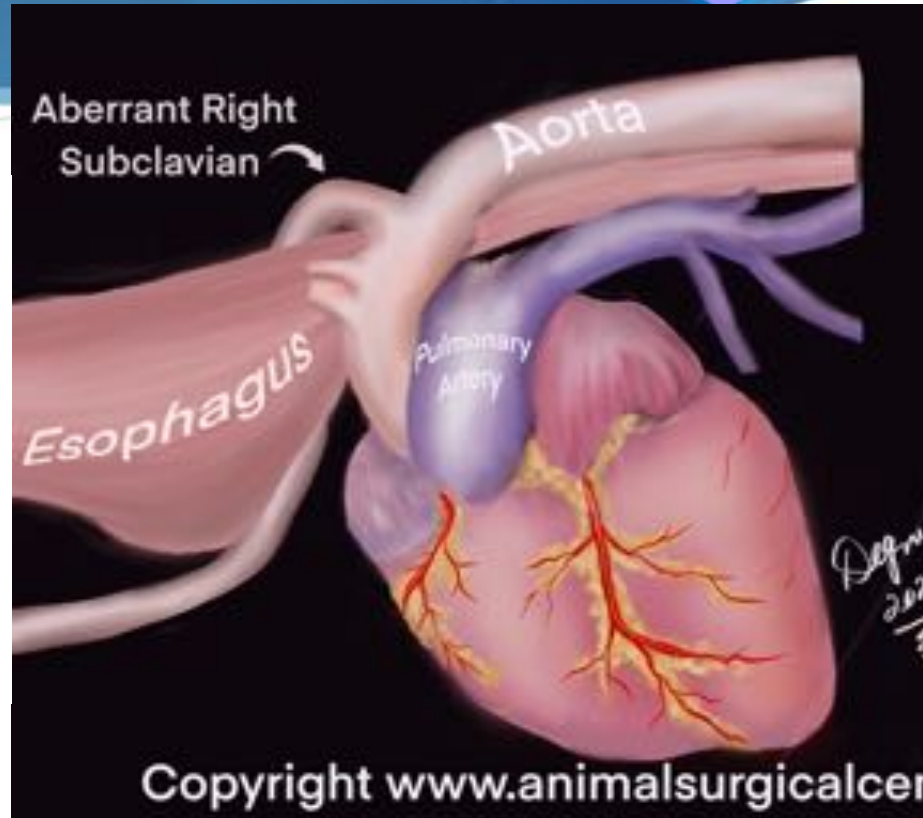
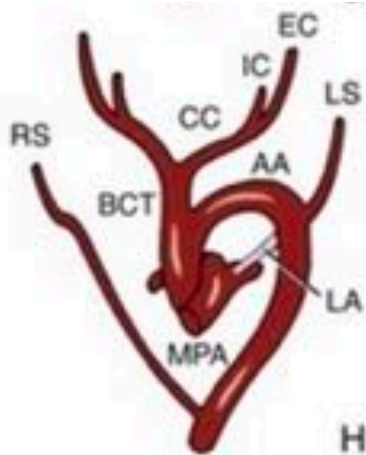
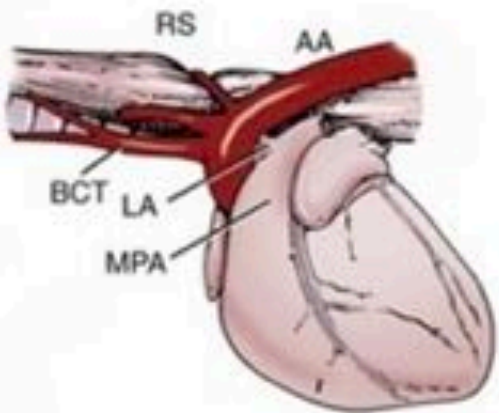




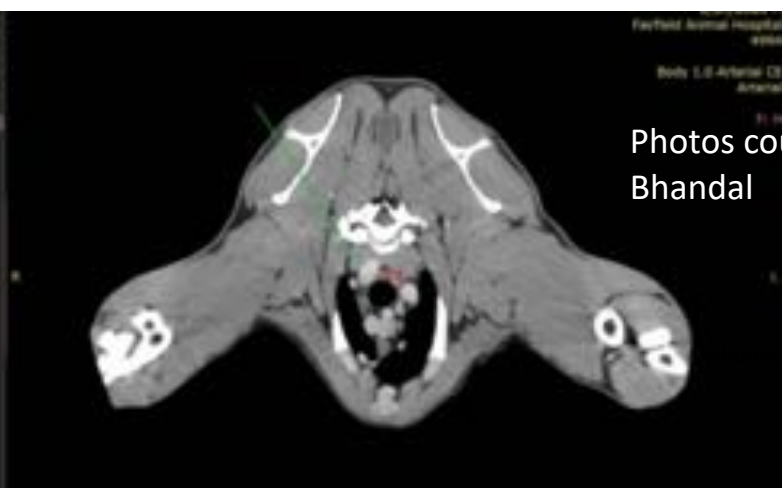
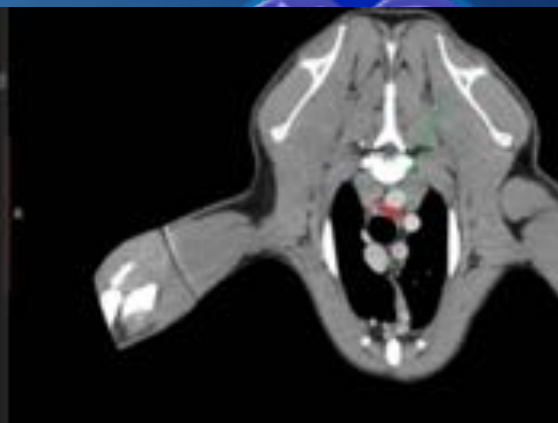




# Right Aberrant Subclavian Artery

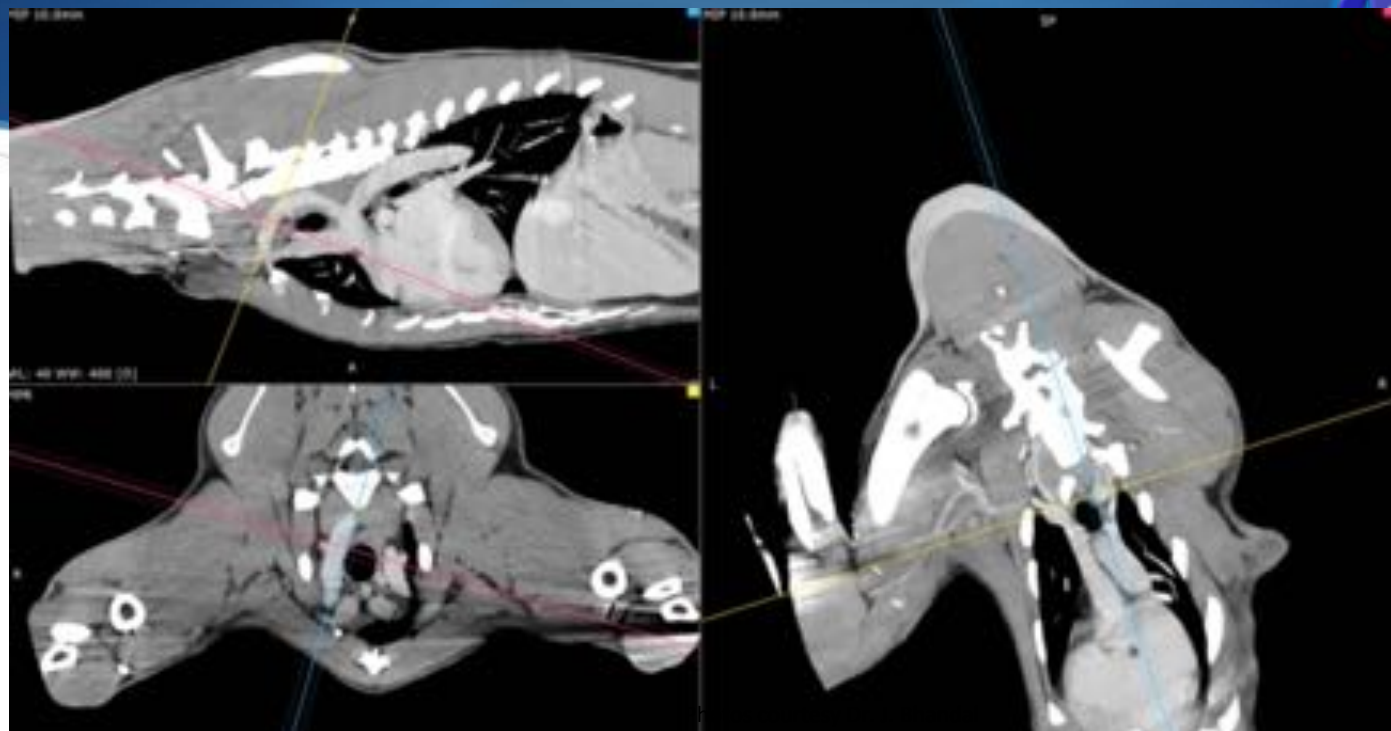


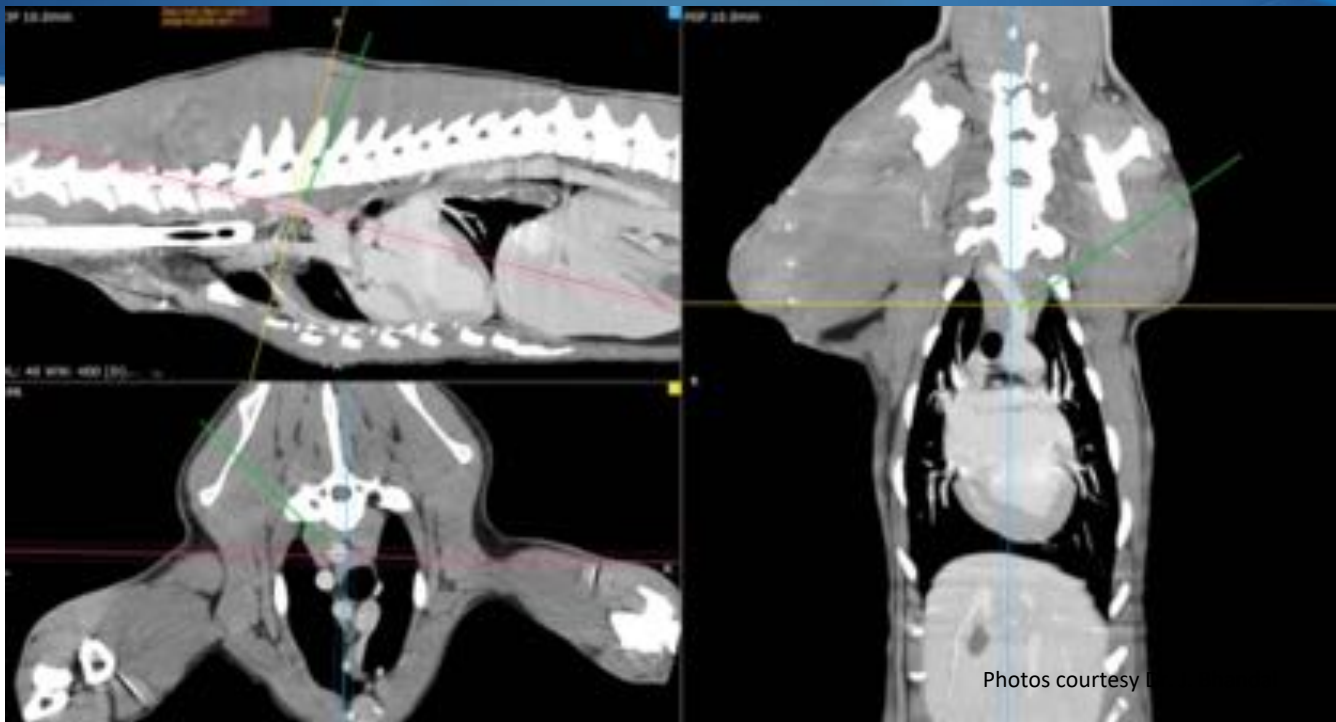


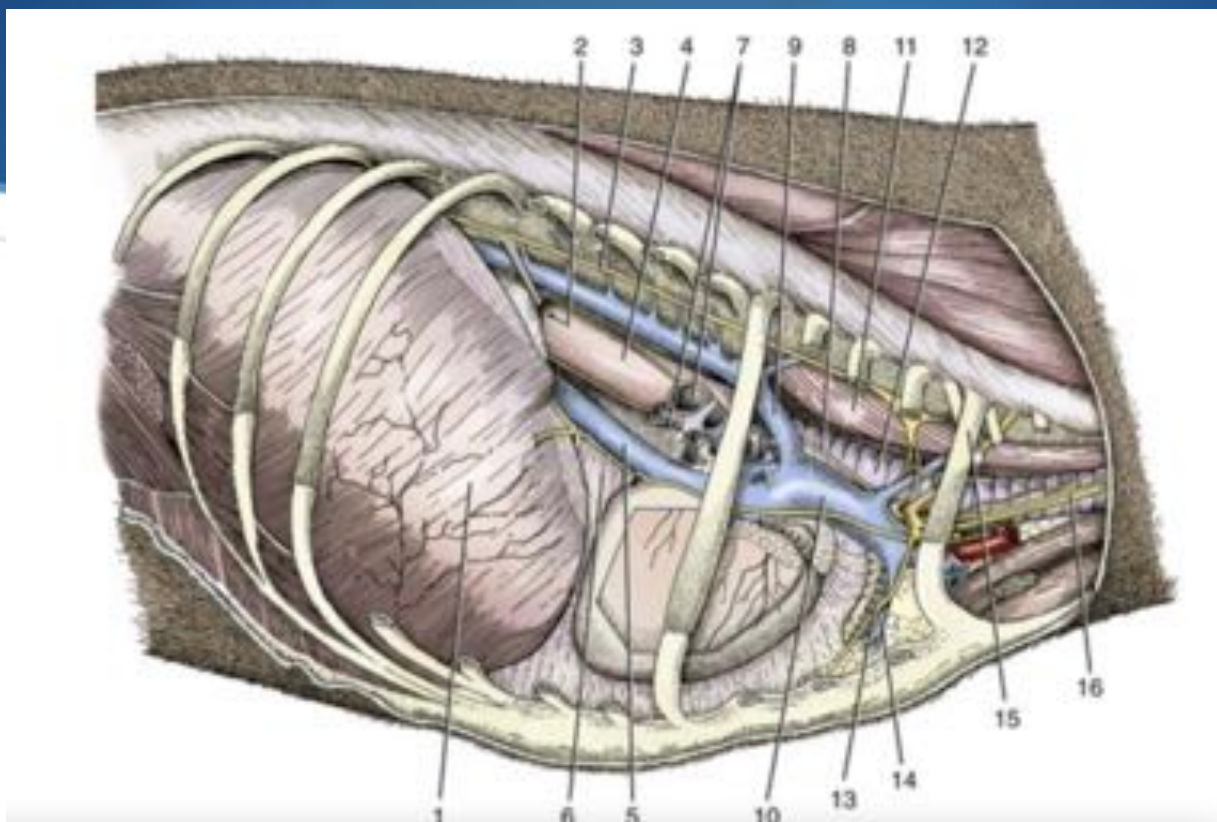


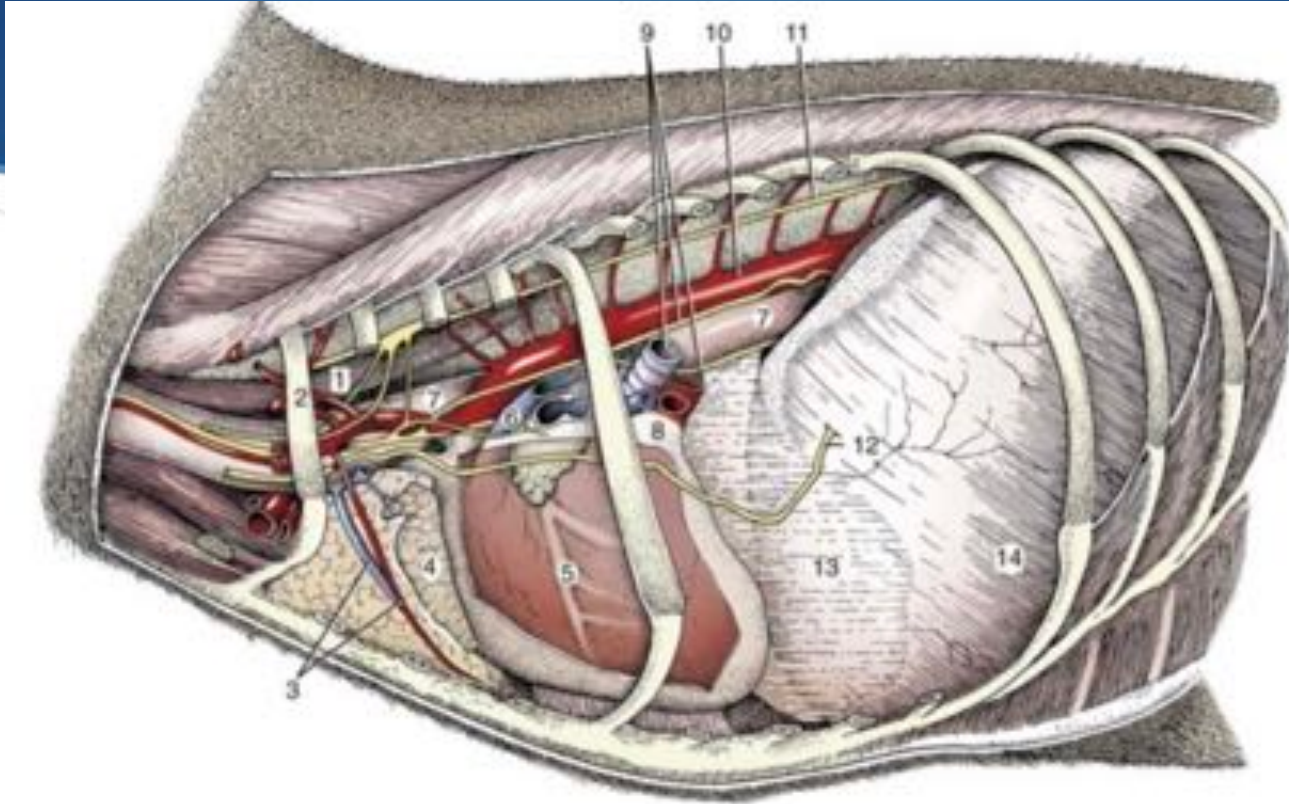
Photos courtesy Dr. J. Bhandal



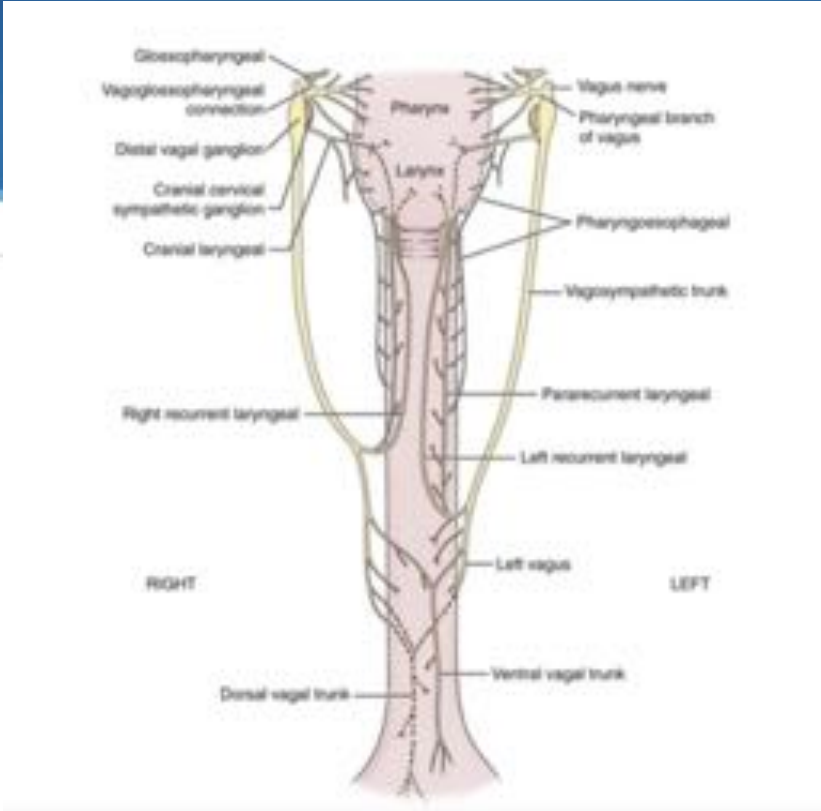












# Patient Prep Prior to Surgery



- ◆ Food: only gruel – blenderized canned or dry food with water
- ◆ Feed 4 times daily
- ◆ Upright feedings in a Bailey's chair – home made or purchase
- ◆ Treat pneumonia if present
  - ◆ Avoid caustic antibiotics like clindamycin and doxycycline
  - ◆ Clavamox is OK; Baytril OK if puppy done growing (no younger than 8 months in small and medium breeds; and older in large breeds)
- ◆ Screening chest radiographs prior to surgery if patient is sick or coughing



# Chair Feedings











# When No Chair Available



- ◆ Use elevated surface or hold the bowl



Or Do This



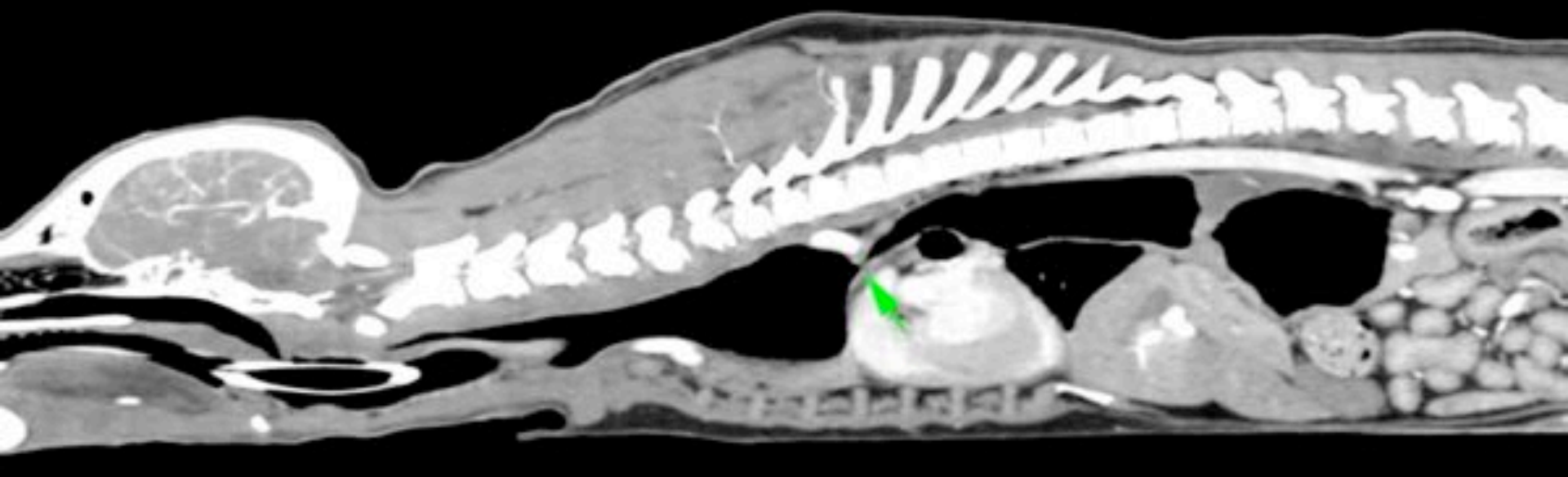


# Gilliland

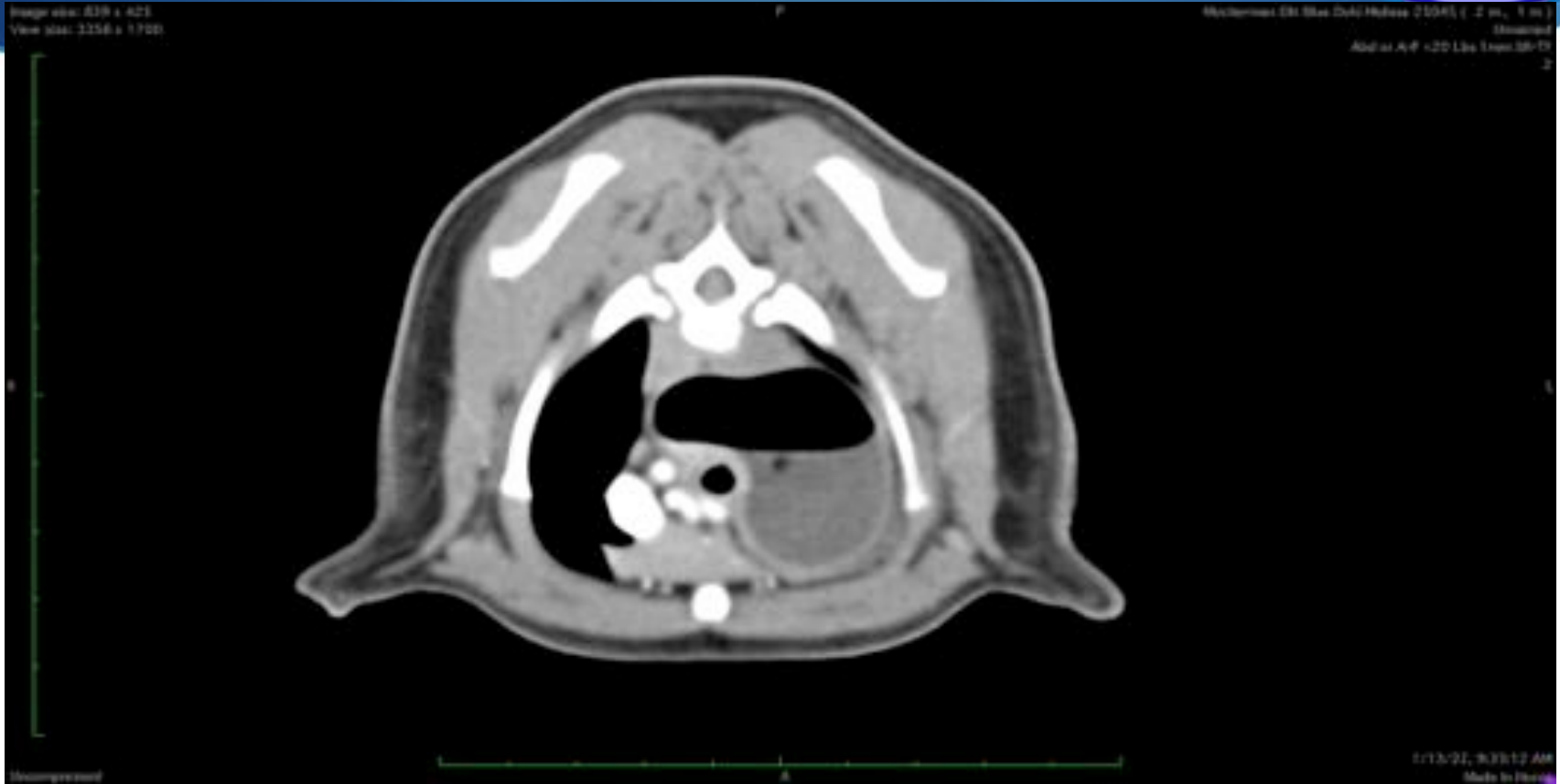


- ◆ Golden retriever, 11 wks old, male
- ◆ History: regurgitation of solid food, can handle liquid diet
- ◆ Examination: mildly thin body condition otherwise exam
- ◆ Plan:
  - ◆ review of referral radiographs
  - ◆ CBC, chemistry
  - ◆ CT scan of head through abdomen





# Case – Oki Blue Doki



# Case – Oki Blue Doki





# Surgery



- ◆ Right lateral recumbency
- ◆ Left 4<sup>th</sup> most common in dogs, but 5<sup>th</sup> intercostal thoracotomy may be needed in cats
  - ◆ Plan from CT scan
- ◆ Does not need to be a large incision

# Surgery



- ◆ Identify Vagus, isolate and retract ventrally if needed
- ◆ Open pleura over ligamentum (palpable)
- ◆ Ligate and divide ligament – suture or Ligasure
- ◆ Free up the esophagus amply
- ◆ Ensure no fibrous bands are left cranially and caudally
- ◆ Seal and divide left azygous
- ◆ Ligate and divide aberrant subclavian
- ◆ Pass partially inflated large endotracheal tube down esophagus

# Surgery



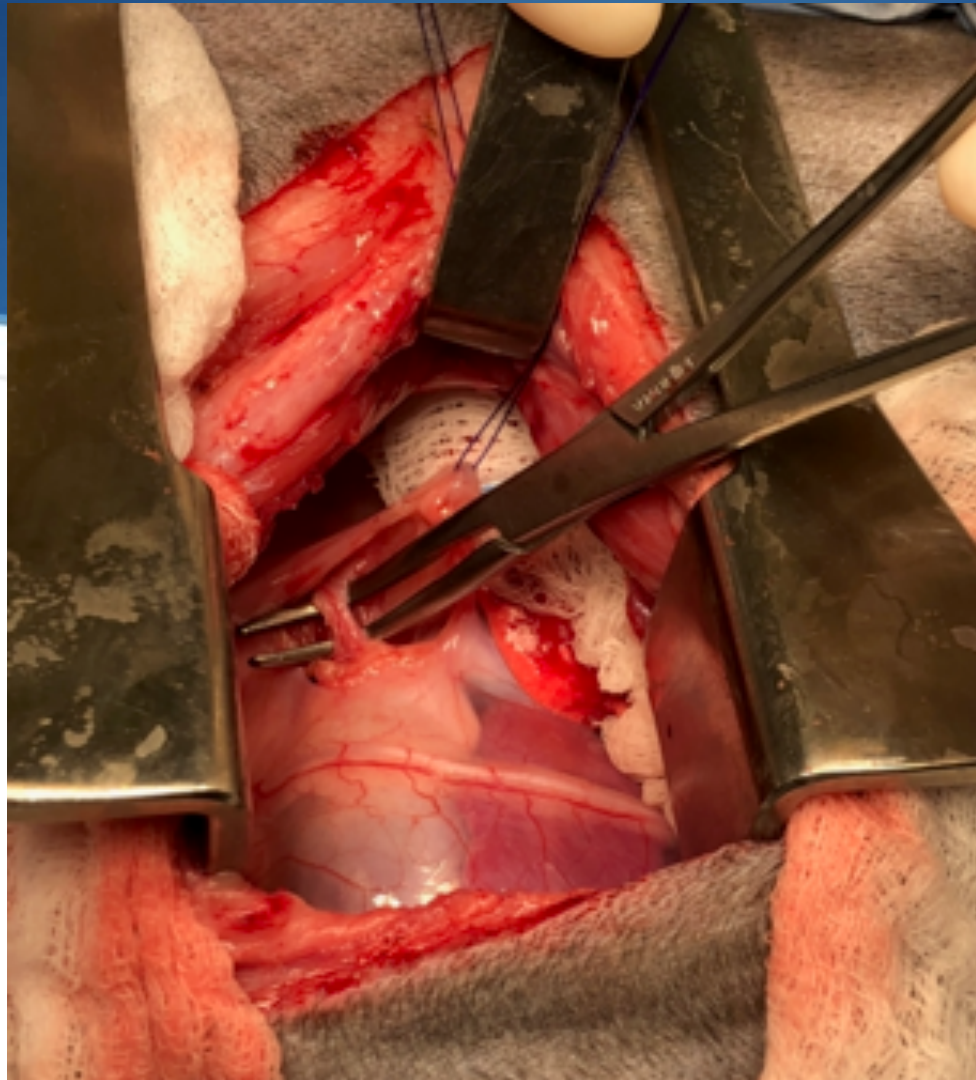
- ◆ Double aorta
  - ◆ Requires division/oversew on one of the arches to free esophagus and trachea

# Put Bolster Under Chest Just Caudal to Forelimb

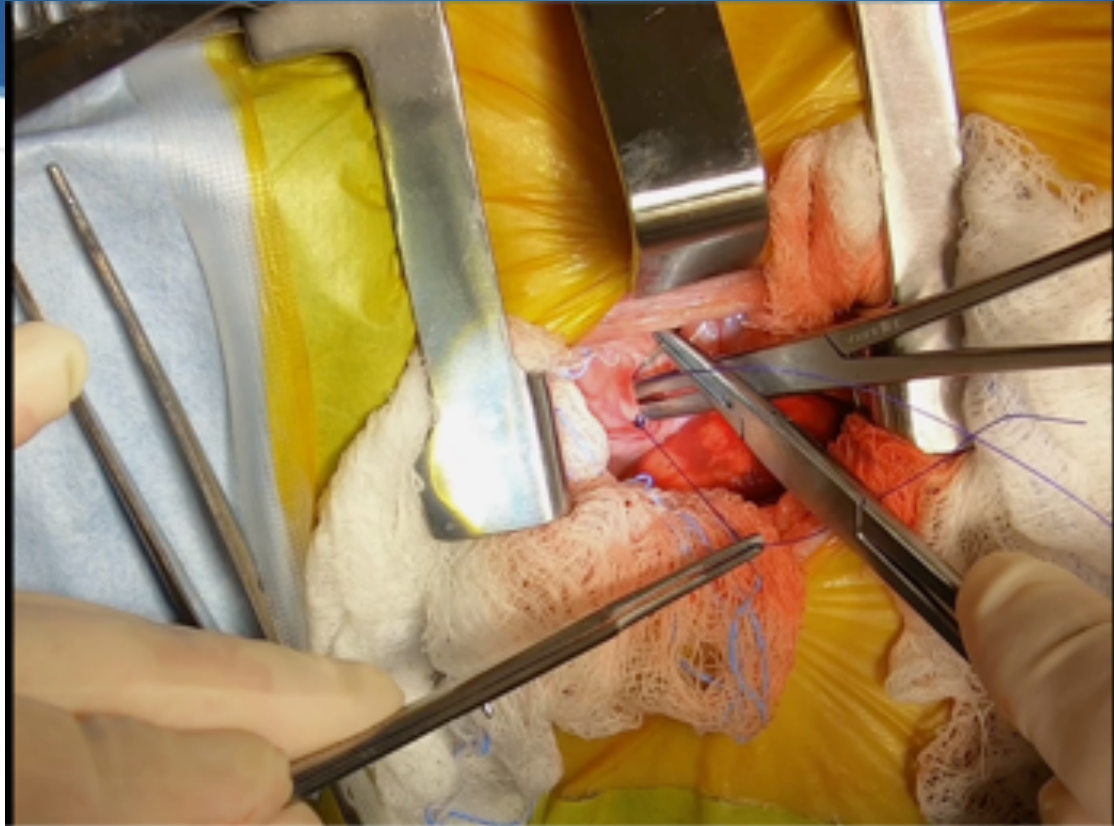


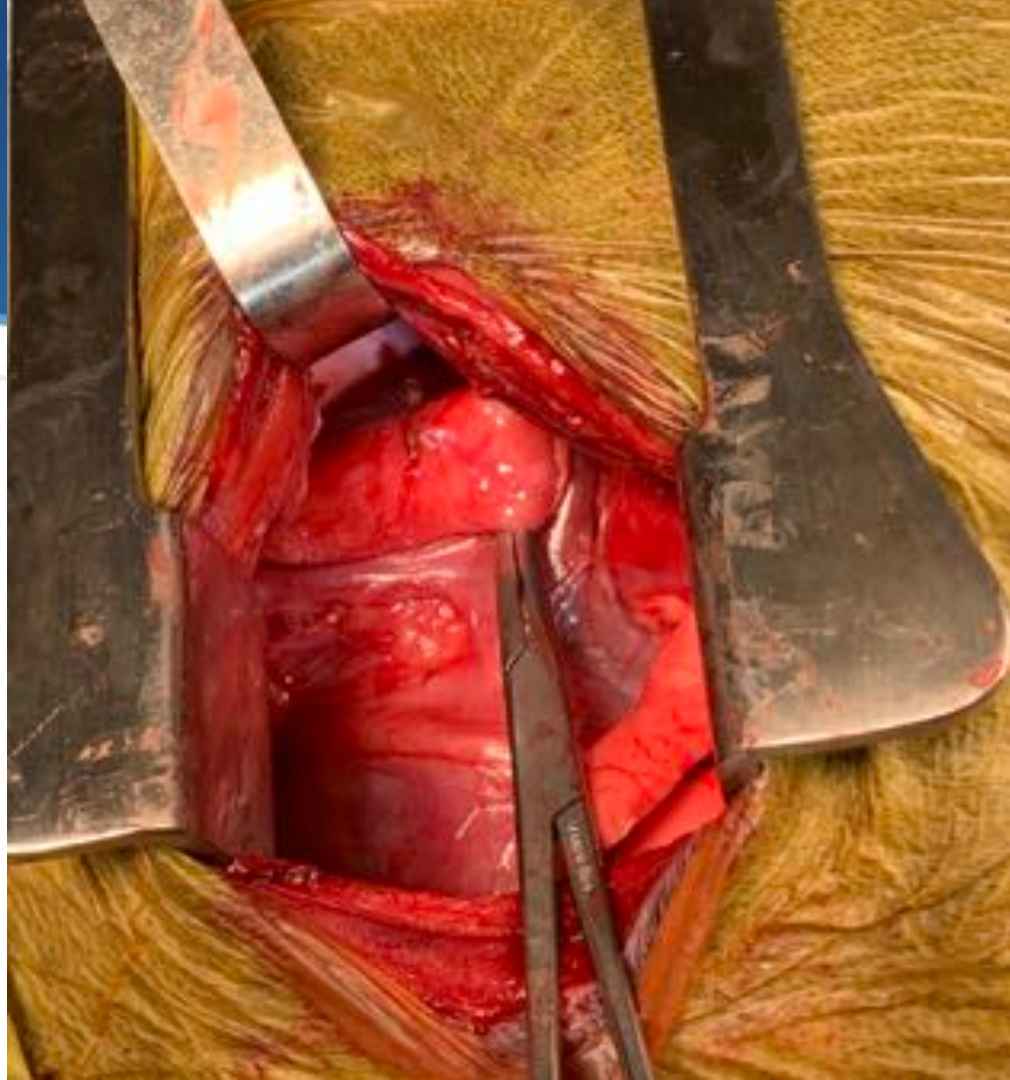






# Video

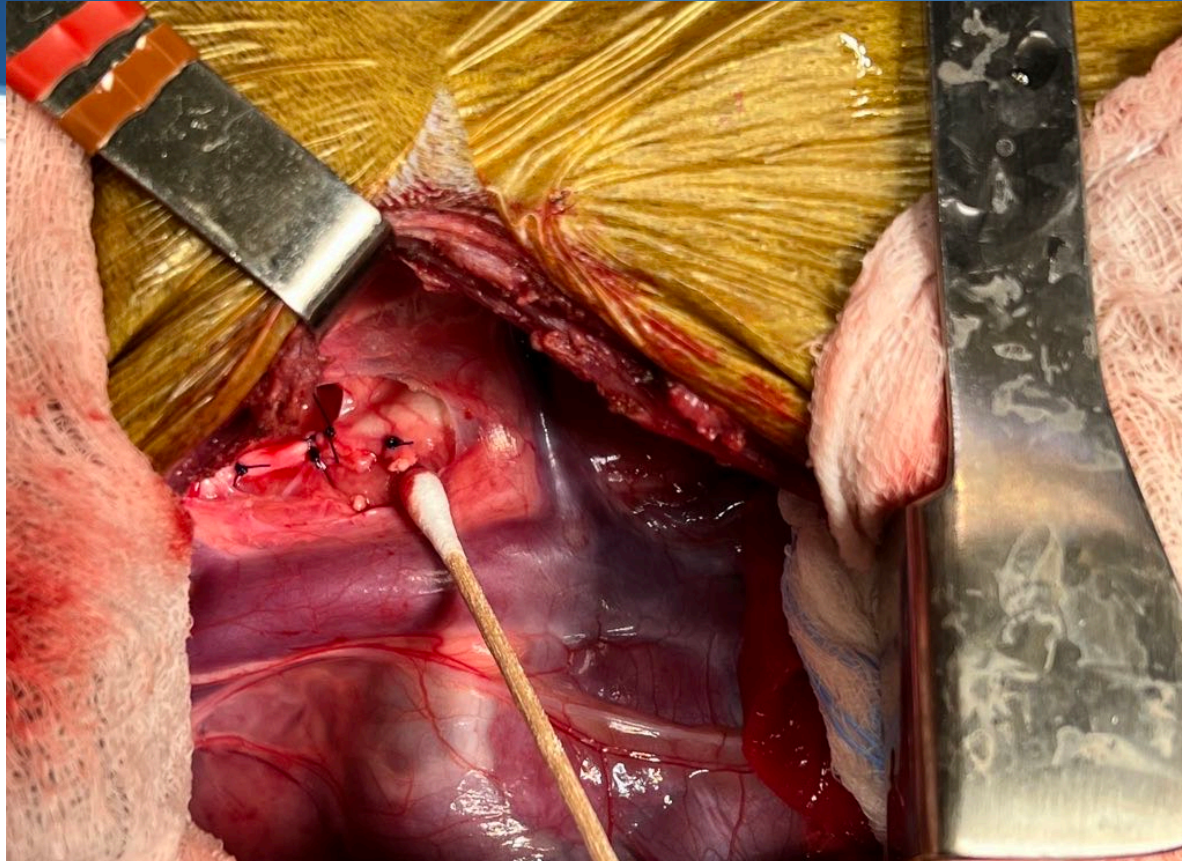






# Abberent left vena cava and left azygous

Animal Surgical  
Center of MI



# Aberrant Left Subclavian



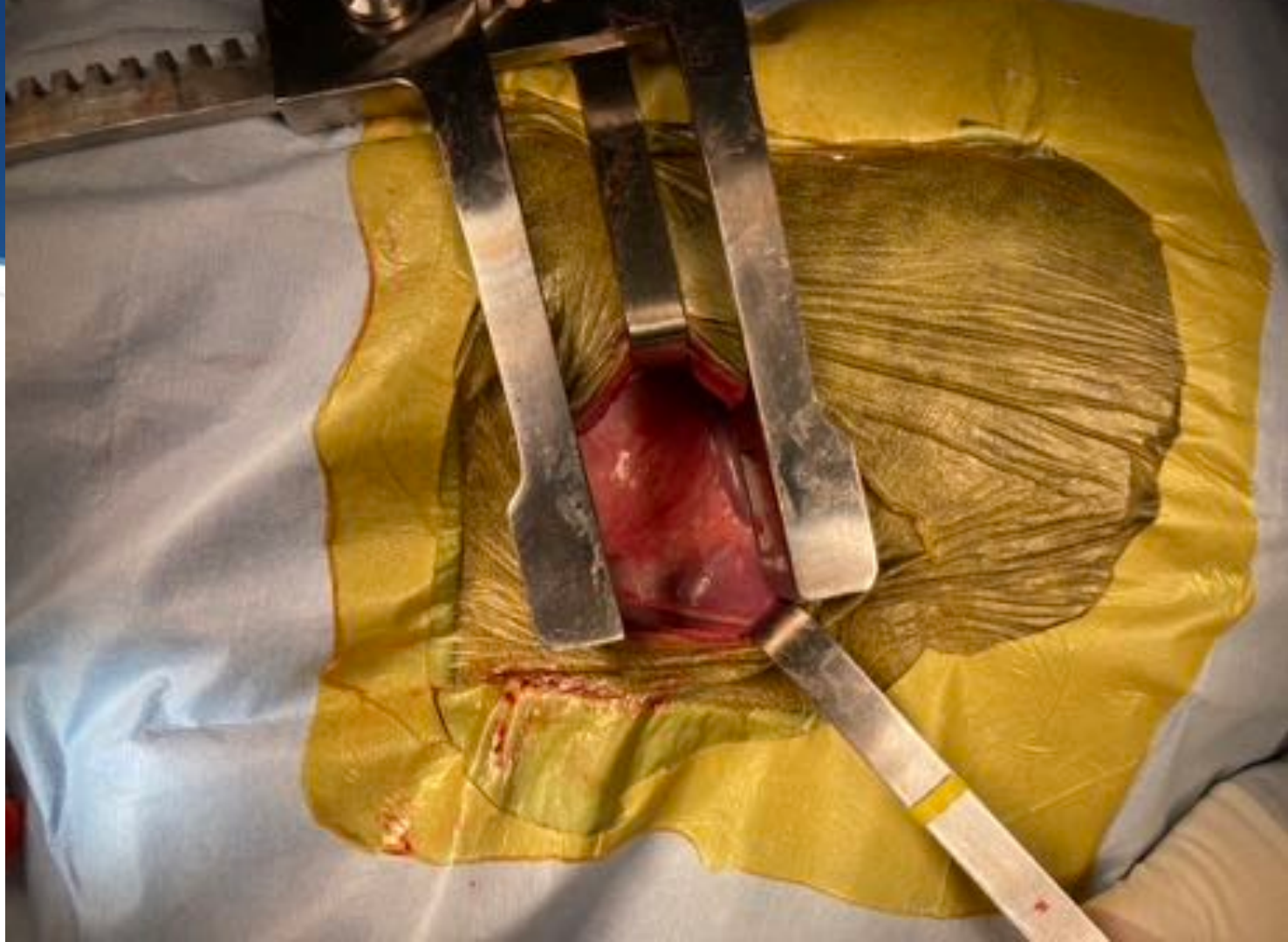
- ◆ Transect vessel to free esophagus – is it always needed?
- ◆ Ensure secure ligatures prior to transection
- ◆ Vessel will retract a long ways cranially after transection
- ◆ This procedure seems to improve the prognosis – better swallowing and less regurgitation
- ◆ Does not seem to have an effect on left forelimb function
  - ◆ Can cause temporary lameness
  - ◆ Adequate collateral circulation to maintain viability of left forelimb



# Radiograph 2 wks postop – clinically normal

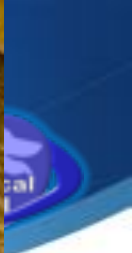














# Aberrant Right Subclavian



otos courtesy Dr. J.  
andal

# CT Scan 4 wks Postop



Photo courtesy Dr. J.  
Bhandal

# Postop Management



- ◆ No chest tube needed postop
- ◆ Antibiotics – avoid those that may cause vomiting
- ◆ Pain management – fentanyl, less regurgitation
- ◆ H2 blocker – Pepcid or omeprazole
- ◆ Motility modifiers
  - ◆ Viagra 1 mg/kg BID
  - ◆ Cisapride 0.5 mg/kg, BID to TID; give ½ hour prior to feedings
- ◆ Bailey's chair feedings – 2 to 3 months or until there is no regurgitation
- ◆ Barium swallow study – 2 months postop









# Prognosis



- ◆ About 80% success rate
- ◆ Better to treat when dogs are puppies, but even older dogs can do well
- ◆ May still have some regurgitation in some cases
- ◆ Some may need Bailey's chair feedings life-long