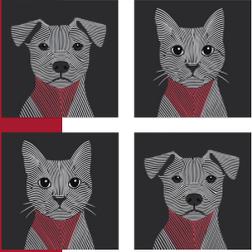


Thoracic Radiology: Pleural and Mediastinal Anatomy and Pathology

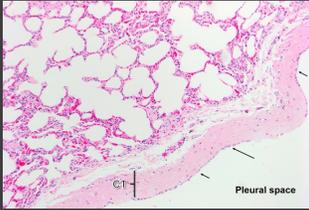
Stephanie Seller, DVM, DACVR




1

The Pleural Space

- Potential space between 2 layers of pleura
- Pleura = serous membranes that fold onto themselves to create the space
- Pleura help lungs to glide along body wall during respiration
- Two pleural sacs (RIGHT and LEFT) contain the lungs
 - Separated by the mediastinum
 - Communication via mediastinal fenestrations, which vary between individuals and species



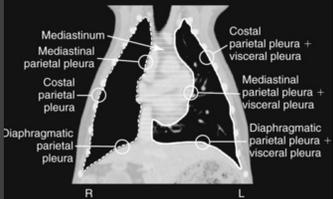
Jennings, R., & Pennaranda, C. (2017). *Veterinary Histology*. The Ohio State University. <https://academic.oup.com/vet/hp/article/doi/10.1093/vetres/vkx008/4401017>

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2

The Mediastinum

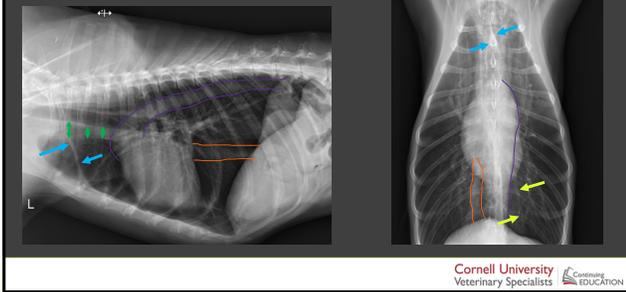
- Encompasses the midline space of the thoracic cavity
- Houses all anatomy between the pleural sacs
- Contains all thoracic viscera EXCEPT the lungs
 - Heart
 - Great vessels
 - Esophagus
 - Trachea
 - Lymph nodes/lymphatic vessels
 - Thymus



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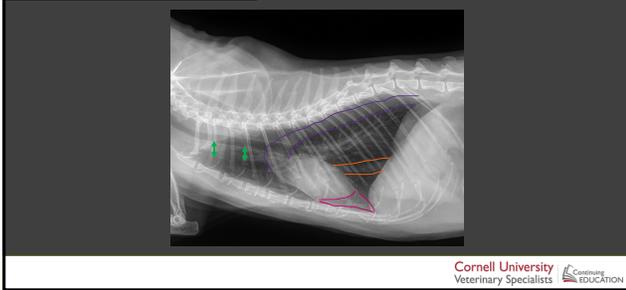
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Normal Radiographic Anatomy - Dogs



4

Normal Radiographic Anatomy - Cats



5

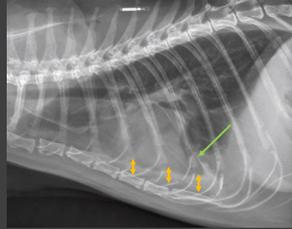
Pleural Space Anatomy: Pleural Fissure Lines



6

Pleural Effusion: Radiographic Signs

- PERIPHERAL widening of pleural fissure lines
 - Wider medially? It is probably just fat.
- Effacement of margins of the cardiac silhouette
- Scalloping of ventral lungs
- Retraction of visceral pleural margins from the body wall



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Pleural Effusion Differentials: Dogs

- **Transudate**
 - Hypoproteinemia
 - Clots (PTE, large vessel thrombi)
 - Right sided CHF
- **Inflammatory effusion**
 - Systemic vasculitis
 - Lung lobe torsion
- **Neoplasia**
 - Carcinoma (lung tumors)
 - Round cell neoplasia (LSA especially)
 - Mesothelioma
- **Chyle**
- **Pyothorax**
- **Hemorrhage (hemothorax)**
 - Anticoagulant rodenticide
 - Rib tumors**
 - Hemangiosarcoma metastases
 - Post-pericardiocentesis
 - Lung lobe torsion

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Pleural Effusion Differentials: Cats

- **Left-sided congestive heart failure (CHF)**
 - Occasionally chyloous effusion
- **Feline Infectious Peritonitis**
- **Pyothorax**
 - Unilateral, young cat
- **Neoplasia**
- **Transudate**
- **Inflammatory effusion**



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Pneumothorax: Radiographic Signs

- Gas in the pleural space
- Pulmonary blood vessels do not extend to the thoracic periphery (lung lobes are retracted from the body wall)
- Visualization of the visceral pleural margins of the lungs
- +/- dorsal deviation of the cardiac silhouette from the sternum... not reliable!!



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Pneumothorax: Differentials

- Trauma
- Spontaneous
 - Bulla or other cavitated lesion rupture
 - Complicated/severe pneumonia
 - Asthma (cats)
 - Heartworm (dogs)
- Iatrogenic
 - Thoracocentesis
 - Mechanical ventilation/intubation complications
- Migrating foreign material (grass awns, quills)

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Restrictive Pleuritis – a special case in cats!

- Chronic inflammation → visceral pleural lining of the lungs becomes thickened and stiff
 - Lungs cannot re-inflate to normal volume
- Particularly fast in patients with...
 - Pyothorax
 - Chylothorax
 - Feline infectious peritonitis (FIP) effusions
- Think VERY carefully about sticking a needle in these patients...



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Pleural Masses/Nodules

- Uncommon, most often neoplastic
- Mesothelioma
- Carcinomatosis
- Metastases



Edwards RL, Meirwald J, Newman SJ, Mueller A. Imaging diagnosis—canine thoracic neoplasia. Vet Radiol Ultrasound. 2007;48(6):482-493. doi: 10.1111/j.1744-7447.2007.00283.x. PMID: 17508511

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Pathology of the Mediastinum: Pneumomediastinum

- Free gas in the mediastinum
- Mediastinal space is contiguous with...
 - Retroperitoneum caudally via aortic hiatus
 - Cervical fascial planes cranially
- Gas from ruptured viscus OR Macklin effect
- Macklin effect --> gas from ruptured alveoli tracks along the perivascular interstitium into the mediastinum
 - Sighthounds overrepresented in asymptomatic cases
- Does not in itself require treatment, but severe cases can → pneumothorax

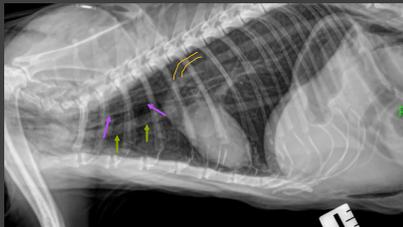


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Pneumomediastinum: Radiographic Signs

- Free gas in the mediastinum
- Ventral wall of trachea outlined by gas
- Great vessels including descending aorta very conspicuous
- Often concurrent cervical emphysema or pneumoretroperitoneum
- Rarely concurrent pneumothorax



Case example via Dr. Robert Cole DACVR shared via LinkedIn 4/15/2022

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Pathology of the Mediastinum: Esophageal Disease

- Esophageal dilation
 - Segmental vs. diffuse
 - "Tracheal stripe" sign
 - Ventral displacement of other mediastinal structures including trachea and heart
- Rupture/leakage
 - Pneumomediastinum, mediastinal effusion, pleural effusion
- Masses
 - *Spirocerca lupi* infection
 - Neoplasia very uncommon (smooth muscle tumors, rarely other sarcomas or squamous cell carcinomas)
- Hernias
- Foreign bodies



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Segmental vs. Diffuse Esophageal Dilation

- Segmental dilation
 - Foreign bodies with dilation cranial to FB
 - Vascular ring anomalies
 - Strictures with dilation cranial
 - Esophageal diverticulum
 - Bulldogs... can be normal around thoracic inlet!
- Diffuse dilation
 - Esophagitis
 - Gastroesophageal reflux
 - Aerophagia
 - Neuromuscular/functional motility disorders (e.g. megaesophagus)



R

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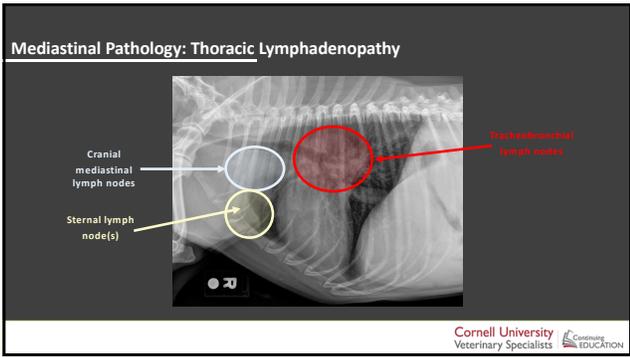
Pathology of the Mediastinum: Mediastinal Masses

- Cranial mediastinal masses most common
 - Thymoma
 - Lymphoma
 - Ectopic thyroid carcinoma
 - Mediastinal cysts (cats!)
 - Peripheral nerve sheath tumors (craniodorsal*)
 - Heart base tumors (chemodectomas)
- Caudal mediastinal masses much less common
 - Hemangiosarcoma, fibrosarcoma
 - Accessory lung lobe masses trying to fool you
 - Mediastinal serous cavity abscesses/paraesophageal abscesses

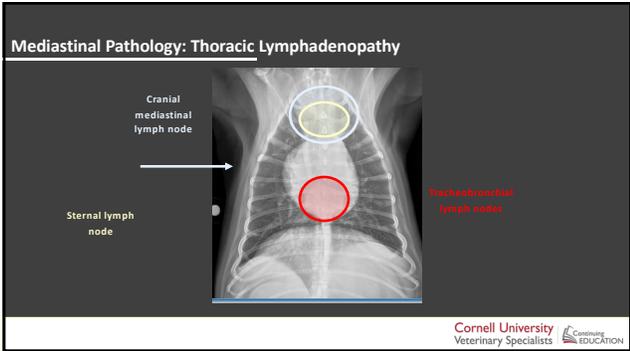


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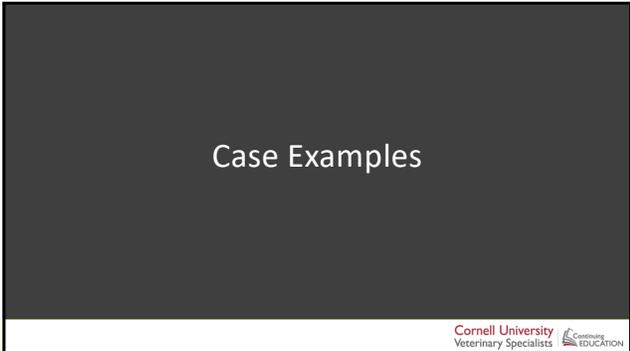
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Case #1: 2.5 year old MC GSHP



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Case #2: 4.5 yo Abyssinian



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Case #3: 18 month old MC Border CollieX



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