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Are All Bulldog Radiographs Abnormal? Breed Variations in Diagnostic Imaging

If your hospital is anything like mine, you are likely experiencing the great French Bulldog epidemic of the 21st Century. Bulldogs are notorious for having challenging radiographs that may be interpreted as abnormal (especially with some recent AI algorithms!), when in fact, the dog is normal. The purpose of this presentation is to review in detail why imaging of certain breeds may differ from our pattern recognition of the more 'generic dog'. Errors in interpretation are not limited to inexperience with one breed over another. Errors in diagnostic imaging can also be related to differences in radiographic technique/positioning.

Breed Variants:

Bulldogs:

- The cranial mediastinum is often widened, giving the impression of a thoracic mass.
- The cranial border of the cardiac silhouette may not be visible on the lateral radiograph of a bulldog's thorax. This is partly due to the wide mediastinum. This is also related to the relatively small size of the bulldog's right cranial lung lobe. The right cranial lung lobe of other breeds will arch to the left of midline, cupping the cranial border of the heart. This is seldom the case with bulldogs.
- A mild to moderate bronchial pattern is often noted in bulldogs that have no sign of lower airway disease.
- Mid-to-caudal thoracic vertebral anomalies (wedge, butterfly, and block vertebrae) are common in bulldogs without any clinical signs of T3-L3 neurological deficits.
- The trachea of a bulldog (and other brachycephalics) is normally smaller than other breeds. This makes the diagnosis of tracheal hypoplasia or tracheitis somewhat tricky.
- The soft palate of a bulldog (brachycephalics) is larger than other dogs
- The bulla walls of brachycephalic breeds are thicker and smaller in luminal volume

Basset Hounds:

- The VD projection of a Bassett Hound (and some Dachshunds) outlines prominent costochondral junctions at the lateral pleural surface of the lungs. This prominence makes the pleural surface undulate, giving the impression of pleural effusion. This is normal and NOT pleural effusion! The lateral view will confirm this.

Collies, Shetland Sheepdogs, and other Deep-Chested Dogs:

- Shelties and collies (in particular) will have prominent small (1-2 mm) mineral foci in the cranial lungs that represent incidental pulmonary osseous metaplasia (osteoma, osteomata, or heterotopic bone are synonyms). Other dogs will have this too, and these mineralized foci should not be misinterpreted as metastasis. Soft tissue pulmonary metastasis (nodules) must be greater than 4-5 mm to be visible radiographically. When a 1-3 mm nodule is visible in the lung, it is either mineralized (as in the case of osseous metaplasia) or represents an end-on blood vessel.
- Deep-chested dogs in general tend to have an upright cardiac silhouette. This gives the heart a perfectly ovoid shape on the VD projection. This is normal.
- Deep-chested dogs will have cranial positioning of the gastric axis, giving the false impression of microhepatica when the liver is, in fact, normal in size.

Breeds with Too Much Skin or Hair

- Skin folds can increase the opacity of the lungs, particularly on the VD projection. The fold tends to lie along the lateral peripheral margin of the lung, and should not be confused with pneumothorax. And then there's the Sharpei dog...Deal with it! Skin folds.
- Puli... crazy looking!
- Wet hair can complicate interpretation of radiographs (eg. Abdominal radiographs AFTER a POCUS exam).

Imaging Technique & Positioning:

- Overexposure will give the impression of a decrease in opacity to lungs (falsely diagnosing pneumothorax, oligemia, etc), and potentially obscuring our ability to identify soft tissue swelling on orthopedic radiographs.
- Underexposure will give the false impression of a lung pattern. Expiratory phase of respiration and overlying fat will also accentuate the increased opacity of lung.
- Obliquity will always pan off parts of the body we are not used to seeing, especially if we are accustomed to viewing properly positioned radiographs.
- A positioning-related variant of normal we will discuss in lecture represents one of the most common questions posed to me when presented with a radiograph of a choking dog: The NORMAL transverse process of C6 is not a bony esophageal foreign body. Pulling the limbs caudally to evaluate the neck will invariably show this normal bony structure.
- The normal thymus can appear as an increase in opacity cranial to the heart in young dogs. Folks are generally comfortable with identification of the normal thymic “sail sign” on the VD projection but may falsely diagnose pneumonia on an oblique lateral projection.

Why Do We Make Mistakes?

- Lack of familiarity with breeds, changes in technique positioning are all reasons for making mistakes, but our most common errors in imaging interpretation involve “Satisfaction of Search”. Satisfaction of search error occurs when one abnormality is positively identified, but we fail to identify other potentially more critical abnormalities in the study.