

# Radiographic Evaluation of the Feline Thorax: Cats are Unique!

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Radiography is a commonly applied diagnostic test and good screening tool for thoracic disease. Much emphasis is placed upon accurate interpretation of thoracic radiographs, the final steps of which require the veterinarian to generate a succinct, prioritized list of differentials, and the selection appropriate steps to ascertain a diagnosis and/or institute therapy. While radiography remains the primary screening test for cardiac disease, there is some controversy as to the sensitivity and specificity of thoracic radiography and cardiac diseases. In dogs, there is some variability in our ability to identify and accurately diagnose some forms of congenital cardiac diseases, and congestive heart failure has specific features that allow us to identify whether it is left or right-sided. Cats, however, often present a diagnostic challenge. Features of pleural effusion can occur with left or right sided congestive heart failure. The pattern for pulmonary edema can be variable. And cats with cardiac disease may have a normal cardiac silhouette. In addition, there are changes specific to the cardiac silhouette that are common in older cats, and are considered normal. The objective of this lecture is to review the ways in which cats differ from dogs with respect to radiographic abnormalities related to cardiac and pulmonary disease.

## Objectives

1. Review features of left and right sided congestive heart failure in dogs and cats
2. Understand the different radiographic appearances of congestive heart failure in cats
3. Review changes in feline cardiac shape and position, and how they correlate with disease

## Key points

1. Pleural effusion may occur in cats with left-sided congestive heart failure
2. Cardiogenic pulmonary edema in cats can have a variable distribution
3. Cardiac enlargements may not always relate directly to the suspected abnormality
4. Changes in heart position and aortic shape may occur incidentally in older feline patients

## Cardiac shape

Cardiac shape, size and displacement of surrounding organs are important features to assess when evaluating the heart for evidence of disease. There is evidence to suggest that radiography is not as sensitive and specific for cardiac disease as we would hope. Diseases such as aortic stenosis, a common congenital abnormality, often present with normal radiographs.

In cats, hypertrophic cardiomyopathy often causes enlargement of the left side of the heart, with changes in shape that reflect left ventricular and left atrial enlargement. However, many cats with HCM have no radiographic evidence of disease.

Similarly, it has been often proposed that a “valentine” shaped heart is nearly pathognomonic for biatrial enlargement and HCM. While the “valentine” shape is abnormal, it can be seen with a host of cardiac diseases, including RCM, HCM, and ICM.

## Cardiac position and size

The appearance of thoracic radiographs of cats has little variation as compared to their canine counterparts. Thoracic radiographs of a Toy poodle, a Doberman, and a Labrador retriever are vastly different. For the most part, domesticated cats have organs with similar size and shape, making comparison between breeds relatively accurate. However, some changes in cardiac position occur with age. The “lazy heart” is often described, and manifests as a heart that is oriented more horizontally within the thoracic cavity on a lateral projection. This is an incidental finding.

Additionally, the descending thoracic aorta often becomes tortuous, or redundant, in older cats. This is again, an incidental finding.

Even changes in size may be misleading. There is evidence to suggest that, though valuable as a screening test, the vertebral heart scale may not be abnormal in cases of cardiac disease or enlargement. The combination of heart size and shape in a more complete assessment of the cardiac silhouette is far more sensitive and specific, but still may miss some cardiac diseases.

## Pleural effusion

The radiographic features of pleural effusion are well-documented, and include increased soft tissue opacity in the thoracic cavity, causing retraction of the lungs from the thoracic wall, scalloping of the ventral lung margins, rounding of the costophrenic angle, and border effacement of the heart and diaphragm. While there is some suggestion that exudates may occasionally be unilaterally distributed, most commonly the nature of pleural effusion cannot be elucidated with radiography alone.

Some pleural transudates in dogs are the result of right sided congestive heart failure, reflecting congestion of the vessels that drain the pleural space, with pleural effusion as the result. In cats, however, the drainage of the pleural space does not follow the same path, and pleural effusion is seen in cats with left sided congestive heart failure rather than right-sided congestive heart failure.

**Pulmonary edema**

Pulmonary edema is detected radiographically as an interstitial or alveolar pattern based on severity. While some mild differences in distribution of this pulmonary pattern can be seen in different diseases causing left sided congestive heart failure (Doberman Pinschers with DCM vs. Toy Poodles with MI), cardiogenic pulmonary edema in dogs is primarily perihilar and caudodorsal in distribution. In our feline patients, however, cardiogenic pulmonary edema can manifest as a ventrally distributed, caudally distributed or multifocally distributed interstitial or alveolar pattern.

**Conclusion**

Radiographic interpretation can be daunting, but also can be fun. It is important to recognize that cats are not just small dogs, and the differences in physiology and pathophysiology translate to differences in the radiographic manifestations of disease. This is specifically true with regard to cardiac disease, where many of the common radiographic findings associated with left and right sided congestive heart failure are different between the species.