



ELSEVIER

REVIEW

Thoracic radiography in the cat: Identification of cardiomegaly and congestive heart failure



Carlo Guglielmini, DVM, Ph.D. ^{a,*}, Alessia Diana, DVM, Ph.D. ^b

^a *Department of Animal Medicine, Production and Health, University of Padua, Viale dell'Università 16, 35020 Legnaro, PD, Italy*

^b *Department of Veterinary Medical Sciences, University of Bologna, Via Tolara di Sopra 50, 40064 Ozzano Emilia, BO, Italy*

Received 1 July 2014; received in revised form 16 February 2015; accepted 9 March 2015

KEYWORDS

Cardiac disease;
Cardiology;
Feline;
Pulmonary edema;
Vertebral heart scale

Abstract Thoracic radiography is one of the most commonly employed diagnostic tools for the clinical evaluation of cats with suspected heart disease and is the standard diagnostic method in the confirmation of cardiogenic pulmonary edema. In the past, interpretation of feline radiographs focused on a description of the qualitative radiographic features of feline heart disease or the measurement of the cardiac silhouette in healthy cats and cats with different cardiovascular disorders. More recently, studies have begun to critically address the issue of the diagnostic accuracy of thoracic radiography in the diagnostic work-up of cats with heart disease. In these studies, qualitative and quantitative radiographic parameters were compared to echocardiographic findings to evaluate the usefulness of thoracic radiography for the identification of cardiac enlargement and pulmonary edema in the cat. Thoracic radiography is reasonably specific but has a low sensitivity when identifying cardiomegaly in cats with mild structural heart disease. Feline cardiogenic pulmonary edema has a variable radiographic presentation and several specific radiographic findings (i.e., enlargement of the left atrium and the pulmonary veins) can be absent or non-recognizable in affected cats.

© 2015 Elsevier B.V. All rights reserved.

* Corresponding author.

E-mail address: carlo.guglielmini@unipd.it (C. Guglielmini).

Abbreviations

ARVC	arrhythmogenic right ventricular cardiomyopathy
CHF	congestive heart failure
CTR	cardiothoracic ratio
DCM	dilated cardiomyopathy
DV	dorso-ventral
HCM	hypertrophic cardiomyopathy
LA	left atrium
LA:Ao	left atrium to aortic root ratio
LAE	left atrial enlargement
LA-VHS	left atrium vertebral heart scale
UCM	unclassified cardiomyopathy
VD	ventro-dorsal
VHS	vertebral heart scale

Radiographic anatomy of the normal heart and the pulmonary vasculature

The normal feline cardiac silhouette

Thoracic radiography is one of the most commonly employed and useful tools in the diagnostic work-up of cats with cardiac disease.^{1,2} It is used for differentiating cats with respiratory distress associated with cardiac disorders from those with respiratory distress associated with primary respiratory disorders.³ The standard views for radiographic evaluation of the thorax and cardiovascular system are the lateral view and the dorso-ventral (DV) or ventro-dorsal (VD) projection.^{1,2,4–6} The heart is the largest organ of soft tissue opacity within the thorax and it is located in the mediastinum spanning from approximately the fourth to the sixth intercostal space.^{4–6} On lateral radiographs, the base is the wider and most dorsal part of the heart, while the apex is narrower and oriented caudally and ventrally. The long axis of the cardiac silhouette in the lateral view lies more parallel to the sternum in the cat than in the dog, particularly in geriatric cats.^{4,7} On a VD/DV projection, the direction of the apex is more variable than in the dog, pointing only slightly to the left and closer to the midline.^{4–7}

The true outlines of the heart and its internal chambers are not visible on thoracic radiographic projections. In the lateral view, the two atria are relatively parallel, superimposed on one another, and are located just below the tracheal bifurcation at the base of the heart. The right ventricle envelops the left ventricle that lies slightly caudally.¹ The cranial and caudal borders of the

cardiac silhouette define the cranial and caudal edge of the right and left ventricle, respectively.¹ The method of clock face analogy has been used to describe the specific chamber locations.^{1,5,6} On the lateral view, the dorso-caudal and ventro-caudal border of the cardiac silhouette are attributable to the left atrium (LA) and left ventricle from 12:00–02:00 and 02:00–05:00 o'clock, respectively. In the cat, the more cranial location of the LA in comparison to the dog makes it more difficult to be identified on the lateral view.^{1,5,6} The cranio-ventral border is attributable to the right side of the heart with the right ventricle from 05:00–09:00 o'clock and the main pulmonary artery and right auricular appendage from 09:00–10:00 o'clock (Fig. 1A and B).^{1,5,6} On the DV or VD views, the LA and left auricle are located at 01:00–02:00 o'clock and the left ventricle at 02:00–05:00 o'clock.⁵ The right ventricle is found at 05:00–09:00 o'clock and the right atrium at 09:00–11:00 o'clock.^{1,5,6} The cranial margin of the silhouette (from 11:00–01:00 o'clock) is occupied by the aortic arch, while the main pulmonary artery may be cranial to the LA or not seen at all (Fig. 1C).^{1,5,6}

Several factors can influence the appearance of the normal cardiac silhouette on a radiograph potentially leading to misdiagnoses.^{8–11} The effects of breed, positioning, pericardial fat, age, and phase of the respiratory and cardiac cycles on thoracic cardiovascular structures have been reported in cats.^{8–11} The feline somatotype is more uniform in comparison to the dog, and therefore the normal feline heart as projected on radiographs is generally less affected by breed.^{4,5} Variations in body position may cause changes in the radiographic appearance of the cardiac silhouette, but these differences are less prominent in comparison to those previously reported in dogs.⁸ In particular, the most obvious shape change is a more rounded contour of the cranial right aspect of the heart on VD radiographs compared to DV views.⁸ An incorrect diagnosis of cardiomegaly can be made in cats with a large amount of pericardial fat contributing to the overall size of the cardiac silhouette.¹¹ The cranial border of the cardiac silhouette in obese cats may be obscured on the lateral projection, and fat may mimic a cranial mediastinal mass.¹¹ On the VD projection, the cranial mediastinum may be widened and the contribution of pericardial fat to the overall shape of the cardiac silhouette may not be discernable. Pericardial fat usually is distinguished more clearly on lateral compared to VD radiographs.^{5,11} Superimposition of pericardial fat should be suspected when there is a large amount

Download English Version:

<https://daneshyari.com/en/article/10961897>

Download Persian Version:

<https://daneshyari.com/article/10961897>

[Daneshyari.com](https://daneshyari.com)