Evaluation of Normal Lung Volume and Density with Multi-Detector Computed Tomography in Dogs

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Purpose: To quantitatively assess the difference of the normal lung volume and density according to the position and the shape of the thorax by multi-detector computed tomography (MDCT) and assess their correlation.

Materials and Methods: Helical CT of the thorax was performed on 4 different positions such as dorsal, left lateral, right lateral and ventral recumbency in 4 pekingese and 4 maltese dogs. During CT scanning, dogs were kept on inspiration applied the positive pressure of 15-20 cm H2O. Though the 3-dimensional reconstruction of CT images, the lung parameters were measured as the volume and density of the left, right including accessory lobe, and total lung.

Results: The mean body weight of experimental animals was 5.0 ± 0.9 kg. There was no significant correlation between body weight and lung volume/density. The total lung volume in dorsal recumbency was the largest (333.2 ± 70.2 ml), and the smallest (306 ± 72.4 ml) in ventral recumbency. The lung densities for dorsal entral recumbency position are -746.6 ± 39.7 HU and -740.6 ± 47 HU, respectively. The volume of dependent lung was significantly larger and density was smaller than non-dependent lung for left and right lateral recumbency ($p < 0.05$). Lung volume and density in Pekingese significantly larger and lower than maltese dogs ($p < 0.05$). The correlation coefficient between the lung volume and density was significantly represented to -873 ($p < 0.01$) in all position, and the regression coefficient was -1.4 ($p < 0.05$).

Conclusion: The total lung volume measured with MDCT is correlated with the lung density, and the lung density is useful to predict the normal total lung volume. There was significant difference of lung volume between barrel chested Pekingnese and nonbarrel chested dogs (Maltese). Also, dependent position could affect lung volume and density.

Key words: lung, volume, density, MDCT, dog

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