Usefulness of tomographic measurements of vertebral heart volume ratio and vertebral heart scale in canine heartworm disease

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Introduction

Currently, computed tomography (CT) plays an important role in the diagnosis of heart disease and can provide prognostic information when echocardiography is not available. Tomographic measurements of vertebral heart volume ratio (VCVR) and vertebral heart scale (VHS) have previously shown high correlation with their respective measurements by radiological study, and have been especially accurate in the diagnosis of cardiac diseases that produce a not radiographically evident cardiomegaly. The present study aimed to evaluate the usefulness of VCVR and VHS in the diagnosis of pulmonary hypertension (PH) in dogs suffering from heartworm disease (HWD).

Methodology

A total of 31 dogs diagnosed with HWD by antigen detection test and 30 healthy cardiorespiratory dogs were analyzed using the same CT equipment and following the same anesthetic protocol. Through echocardiography, the presence of PH was diagnosed in 13 dogs with HWD (Tricuspid regurgitation pressure gradient >3.4m/s and right pulmonary artery distensibility index <30%). Dogs were kept in sternal recumbency and post-contrast positive pressure CT scans were performed after administration of 2.0 ml/kg iobitridol (300 mgI/ml). Helical cross-sectional images were acquired using a slice thickness of 1.0 mm at 120 kVp, 200 Ma, and a tube rotation time of 0.6 s. For optimal CT images and better evaluation of the analyzed structures, a soft tissue window configuration was used (WW = 360; WL = 60). The tomographic measurements of VHS and VCVR were carried out by analyzing the cardiac dimensions and the vertebral bodies following guidelines established in previous studies carried out in dogs, using sagittal and transverse CT plane images respectively.

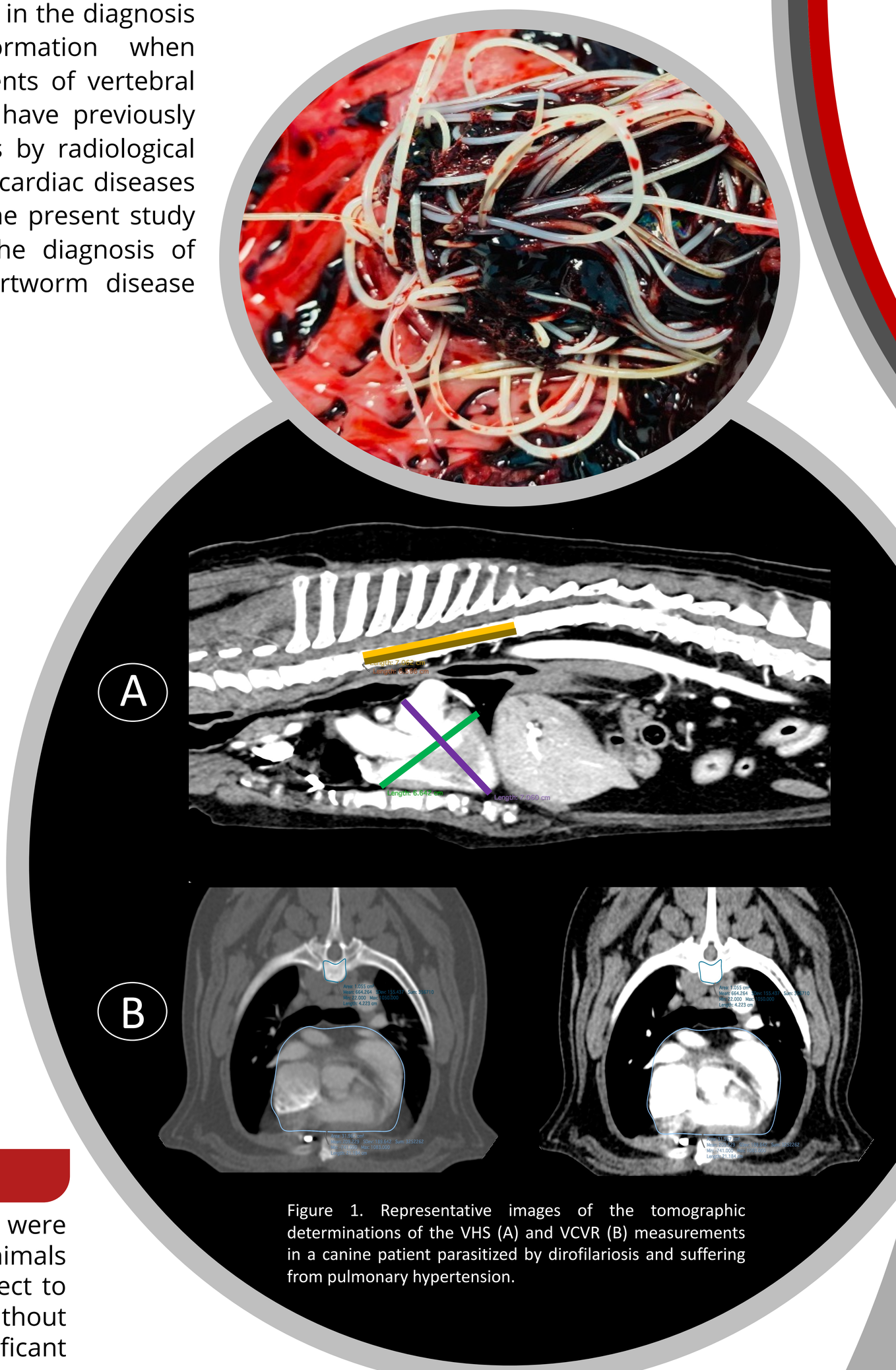

Figure 1. Representative images of the tomographic determinations of the VHS (A) and VCVR (B) measurements in a canine patient parasitized by dirofilariosis and suffering from pulmonary hypertension.

Results

The results showed that the average values of VHS and VCVR were significantly higher (Mann-Whitney U test <0.5) in the animals suffering from HWD and PH (11.19 and 54.02 cm^2), with respect to healthy dogs (8.31 and 39.23 cm^2) and dogs with HWD and without PH (8.92 and 43.33 cm^2). On the other hand, no significant differences were observed (Mann-Whitney U test >0.5) between healthy animals and dogs with HWD and without PH.

Conclusion

Tomographic determinations of VHS and VCVR have proven to be useful in the diagnosis of myxomatous mitral valve disease and canine dilated cardiomyopathy. However, its use in the diagnosis of canine PH has not been implemented. In this study, the results show that cardiovascular changes secondary to the presence of HWD generate cardiomegaly and both VHS and VCVR can be useful measurements in the analysis of PH caused by HWD.

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