

Acoustic Radiation Force Impulse Elastography of the Hepatic Tissue of Canine Brachycephalic Patients

Authors : A. C. Facin, M. C. Maronezi , M. P. Menezes, G. L. Montanhim, L. Pavan, M. A. R. Feliciano, R. P. Nociti, R. A. R. Uscategui, P. C. Moraes

Abstract : The incidence of brachycephalic syndrome (BS) in the clinical routine of small animals has increased significantly giving the higher proportion of brachycephalic pets in the last years and has been considered as an animal welfare problem. The treatment of BS is surgical and the clinical signs related can be considerably attenuated. Nevertheless, the systemic effects of the BS are still poorly reported and little is known about these when the surgical correction is not performed early. Affected dogs are more likely to develop cardiopulmonary, gastrointestinal and sleep disorders in which the chronic hypoxemia plays a major role. This syndrome is compared with the obstructive sleep apnea (OSA) in humans, both considered as causes of systemic and metabolic dysfunction. Among the several consequences of the BS little is known if the syndrome also affects the hepatic tissue of brachycephalic patients. Elastography is a promising ultrasound technique that evaluates tissue elasticity and has been recently used with the purpose of diagnosis of liver fibrosis. In medicine, it is a growing concern regarding the hepatic injury of patients affected by OSA. This prospective study hypothesizes if there is any consequence of BS in the hepatic parenchyma of brachycephalic dogs that don't receive any surgical treatment. This study was conducted following the approval of the Animal Ethics and Welfare Committee of the Faculdade de Ciências Agrárias e Veterinárias, UNESP, Campus Jaboticabal, Brazil (protocol no 17944/2017) and funded by Sao Paulo Research Foundation (FAPESP, process no 2017/24809-4). The methodology was based in ARFI elastography using the ACUSON S2000/SIEMENS device, with convex multifrequential transducer and specific software as well as clinical evaluation of the syndrome, in order to determine if they can be used as a prognostic non-invasive tool. On quantitative elastography, it was collected three measures of shear wave velocity (meters per second) and depth in centimeters in the left lateral, left medial, right lateral, right medial and caudate lobe of the liver. The brachycephalic patients, 16 pugs and 30 french bulldogs, were classified using a previously established 4-point functional grading system based on clinical evaluation before and after a 3-minute exercise tolerance test already established and validated. The control group was based on the same features collected in 22 beagles. The software R version 3.3.0 was used for the analysis and the significance level was set at 0.05. The data were analysed for normality of residuals and homogeneity of variances by Shapiro-Wilks test. Comparisons of parametric continuous variables between breeds were performed by using ANOVA with a post hoc test for pair wise comparison. The preliminary results show significant statistic differences between the brachycephalic groups and the control group in all lobes analysed ($p \leq 0,05$), with higher values of shear wave velocities in the hepatic tissue of brachycephalic dogs. In this context, the results obtained in this study contributes to the understanding of BS as well as its consequences in our patients, reflecting in evidence that one more systemic consequence of the syndrome may occur in brachycephalic patients, which was not related in the veterinary literature yet.

Keywords : airway obstruction, brachycephalic airway obstructive syndrome, hepatic injury, obstructive sleep apnea

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