CARDIAC MECHANICS IN DOGS WITH PATENT DUCTUS ARTERIOSUS : A SHORT TERM SPECKLE-TRACKING ECHOCARDIOGRAPHY STUDY.

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Patent ductus arteriosus (PDA) is one of the most common congenital cardiac defect in the dog. Ductal patency is associated with pulmonary overcirculation, left ventricular volume overload and can rapidly determine congestive heart failure if untreated. Several devices to close the PDA have been used, with Amplatzer Canine Duct Occluder (ACDO©) being considered the safer device with lowest complication rates.
Echocardiography represents the cornerstone of PDA diagnosis, but its role has been recently expanded to wider field of application: device sizing and intraoperative monitoring, as well as a tool to quantify cardiac morphology and function. Speckle-tracking echocardiography (STE) has been used to evaluate cardiac function in a wide variety of diseases in human and veterinary patients, however no study has evaluated its usefulness in dogs affected by PDA both before and after percutaneous closure of PDA.
The aim of our study was therefore to assess standard M/B-mode derived parameter of cardiac function and STE derived longitudinal, radial and circumferential strain and strain rate before and after PDA closure.
Twenty-five dogs of different breeds, age and weight were prospectively recruited and a complete echocardiographic evaluation was performed before and 24 hours after PDA closure. End diastolic and systolic diameters indexed for body surface area (EDVI/ESVI) both derived by M-mode and B-mode views, allometric scaling derived AlloD and AlloS, Sphericity Index (SI) and pulmonary to systemic flow ratio (Qp/Qs) were assessed both pre and postoperatively. STE derived parameters assessed were longitudinal, radial and circumferential strain and strain rate. A statistically significant difference was found in all standard parameters of cardiac function before and after PDA closure ($p<0.002$), with a general decrease in values 24 hours postoperatively. STE derived parameters of cardiac function showed a trend toward a decrease back to normal values, which was statistically significant ($p<0.01$) for circumferential and radial strain and strain rate, while longitudinal strain and strain rate did not reach statistically significance.
Based on our results, no cardiac dysfunction was identified by the use of STE derived parameters both before and after PDA closure, with an increased contractility as identified by higher than normal STE values before PDA closure and a decrease back to normal strain and strain rate values for both circumferential and radial immediately after percutaneous closure. Longitudinal strain persists on higher than normal values, refusing the hypothesis of systolic dysfunction after PDA closure and suggesting a longer reverse remodeling process after PDA closure.

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