

77° CONVEGNO SISVET

Stato: INVIATO - ID: 13476

LEFT AND RIGHT-SIDE ECHOCARDIOGRAPHIC MEASUREMENT OF PULMONARY ARTERY STIFFNESS (PAS) IN HORSES

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The Pulmonary Artery Stiffness (PAS) is a non-invasive echocardiographic index of pulmonary artery elasticity that allows the assessment of structural features and function of the pulmonary vascular bed [1]. In equine medicine, it has been demonstrated that PAS can be easily measured non-invasively by pulsed-wave Doppler echocardiography across the pulmonary valve from the right parasternal short axis view [2]. To the best of the author's knowledge, there are no studies in literature that measured PAS by pulsed-wave Doppler echocardiography from the left side in horses. Therefore, the present study aimed to measure PAS by pulsed-wave Doppler echocardiography from both right and left side and to evaluate whether there was a difference between the two measurements in healthy horses. This study was approved by the Institutional Animal Care Committee of the University of Milan (OPBA_14_2023). Fifteen horses of different sex, age and breed were included in this prospective study. Based on history and physical examination, all horses were deemed healthy and underwent echocardiographic examination to measure PAS. Pulsed-wave Doppler of the pulmonary outflow was acquired from both sides of the thorax: from the right parasternal short-axis view at the level of the pulmonary artery with the sample volume on the arterial side of the pulmonary valve [2]; from the left parasternal angled view of the right ventricular inlet/outlet [3], with the sample volume positioned just above the bifurcation of the pulmonary artery. Maximal frequency shift (MFS) and acceleration time (AT) were measured from at least three nonconsecutive Doppler flow traces, and PAS was calculated as the ratio of MFS to AT. From the right side, the median PAS value was 12.03 kHz/s; from the left side, it was 14.93 kHz/s. A Wilcoxon signed-rank test was used to compare the ranks between the two sides. No statistically significant difference was found in PAS measurements when right and left sides were compared in this study. The absence of differences could be an advantage in equine clinical practice because, as already reported in literature [3], echocardiographic images sometimes can be of poorer quality when obtained from the left side compared to the right side. Moreover, when the images were taken from the left side, the more cranial probe placement was less tolerated by some horses in this study. Hence, if the side does not affect PAS measurement, the possibility of choosing the one best tolerated by the horse can facilitate the echocardiographic examination and may reduce discomfort related to the procedure itself. In conclusion, this study showed that PAS values were not influenced by measurement taken from the right or left side of the thorax in horses. Furthermore, we found that pulsed-wave Doppler measurement of the pulmonary artery was better tolerated by most of the horses when taken from the right side compared to the left.

[1] Baysal et al. Evaluation of pulmonary artery stiffness in newly diagnosed adult patients with asthma, *Echocardiography*, 36: 870-876, 2019.

[2] Alberti et al. Feasibility of echocardiographic estimation of pulmonary artery stiffness in horses, *Journal of Equine Veterinary Science*, 112, 2022.

[3] Long et al. Standardised imaging technique for guided M-mode and Doppler echocardiography in the horse, *Equine Veterinary Journal*, 24: 226-235, 1992.