CARDIOLOGY

LEFT VENTRICULAR DYSFUNCTION IS PRESENT IN POLOCROSSE PONIES WITH MILD AND MODERATE VALVULAR REGURGITATION

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Background: Speckle-tracking echocardiography is a promising technique to identify myocardial wall deformation, which can be applied to assess function of the left ventricle (LV). There are multiple conventional measurements used to assess ventricular function; however, these mainly assess radial function. In humans, speckle-tracking echocardiography detects subtle changes in the function of the myocardium in radial, circumferential and longitudinal planes.

Objectives: To assess LV function in polocrosse ponies with and without left-sided valvular regurgitation.

Study design: Cross-sectional.

Methods: Owners enrolled their ponies voluntarily while at a UK Polocrosse Association (UKPA) tournament. All were competing without exercise intolerance. Cases had left-sided murmurs consistent with either mitral (systolic) or aortic (diastolic) regurgitation. Control horses had no audible murmurs. All enrolled horses underwent echocardiography, with images recorded from the right parasternal window including a longitudinal 4-chamber image, and short-axis images of the LV at the apex and chordal levels. Three cardiac cycles were stored for each image for subsequent offline analysis.

Results: Eighty-five polocrosse ponies were enrolled; with data analysis performed on 34. Control ponies 21 (19 mares, 2 geldings), mean age 15.8 s.d. ± 4.51 years, and case ponies: 13 (6 mares, 7 geldings), age 15.9 ± 5.22 years. Significant differences were identified between controls and cases in longitudinal strain (control mean −22.66 s.d. ± 2.72% vs. case mean −29.02 s.d. ± 2.78%, P = 0.02), apical circumferential strain (−12.70 ± 3.19% vs. −15.08 ± 2.15%, P = 0.01), and basilar rotation (−7.56 ± 2.49° vs. −5.59 ± 2.27°, P = 0.03). Conventional 2-D and M-mode indices of LV function were not significantly different between groups.

Main limitations: Poor image quality disabled speckle-tracking analysis software; small sample size.

Conclusions: Speckle-tracking echocardiography revealed changes in left ventricular myocardial function in the absence of change in traditional LV functional indices.

Competing interests: None declared.

Ethical animal research: UKPA endorsed this study. Owners gave informed consent.

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ACCURACY OF ELECTROCARDIOGRAPHIC AND VECTORCARDIOGRAPHIC CRITERIA TO IDENTIFY THE ANATOMICAL LOCATION OF VENTRICULAR ECTOPY IN HORSES: PRELIMINARY DATA

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Background: Vectorcardiography (VCG) displays size and direction of electrical forces generated by the heart in three dimensions.

Objectives: Comparison between 12-lead ECG and VCG characteristics for anatomical localisation of ventricular ectopy.

Study design: Experimental study.

Methods: A 12-lead ECG [1] (Labsystem Pro, Boston Scientific) was recorded in seven horses under general anaesthesia while endomyocardial ventricular pacing was performed (800–1000 ms cycle length) at the right and left apical, septal and free wall, and the right ventricular outflow tract. Catheter positioning was guided by 3D electro-anatomical mapping (Rhythmia, Boston Scientific) and echocardiography. The VCG was calculated from the 12-lead ECG using custom-made algorithms with Vx-axis right-left, Vy cranial-caudal and Vz ventral-dorsal, similar as in small animals. For ventricular paced complexes, main cardiac vector angles on the VCG and QRS morphologies on each of the 12 leads were determined. With these variables a separate decision tree classifier for VCG and ECG was made in R (version 3.4.4) using the CART algorithm.

Results: Overall accuracy (mean [95% CI]) of the VCG decision tree (84.5% [73.8–92.0%]) was higher compared with the ECG decision tree (74% [62.4–84.0%]). Right and left ventricular ectopy could be differentiated by the initial vector angle in the horizontal VCG plane (97.2% [90.2–99.7%]) and by the polarity of precordial V6 on the ECG (94.3% [83.8–98.2%]). Accuracy to differentiate ectopy within the right VCG: 86.8% [71.9–95.6], ECG: 76.5% [58.8–89.2%] and left ventricle (VCG: 93.5% [79.7–99.2], ECG: 85.7% [69.7–95.2%]) was higher for VCG.

Main limitations: Only seven horses were used and only endocardial pacing was performed.

Conclusions: Current results suggest that 12-lead ECG and especially VCG are useful to identify the anatomical origin of ventricular ectopy.

Competing interests: None declared.

Ethical animal research: Procedures were approved by the Ethical Committee, Faculty of Veterinary Medicine, Ghent University (EC2016/35). All horses were experimental animals owned by Ghent University. Owner informed consent: Not applicable.

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