



A 12-lead electrocardiogram interpretation algorithm to determine the anatomical site of origin of atrial premature depolarizations in horses: preliminary data

Glenn Van Steenkiste, DVM

Equine Cardioteam Ghent University, Department of Large Animal Internal Medicine, Ghent University Belgium

Glenn.VanSteenkiste@ugent.be

Glenn Van Steenkiste, DVM; Dominique De Clercq, DVM, PhD, DipECEIM; Annelies Decloedt, DVM, PhD; Lisse Vera, DVM; Gunther van Loon, DVM, PhD, DipECEIM, Assoc Member ECVDI

Introduction

In human cardiology, the anatomical origin of atrial premature depolarizations (APDs) is derived from P wave characteristics on a 12-lead electrocardiogram (ECG). The aim of our study was to assess whether an equine 12-lead ECG might allow to distinguish sinus rhythm (SR) from an APD and identify the site of origin of APDs.

Materials and methods

In 6 horses, under general anaesthesia, a 12-lead ECG (Labsystem Pro, Boston scientific) was recorded during sinus rhythm and during left and right atrial pacing at specific pacing sites: pulmonary veins, left atrial free wall and septum, right atrial free wall, intervenous tubercle, caudal and cranial vena cava. Catheter positioning was guided by 3D electro-anatomical mapping (Rhythmia, Boston Scientific) and transthoracic ultrasound. In each horse, P wave morphology (singular/bifid/biphasic, positive/negative) during SR and for each pacing location was manually determined in all ECG leads. Based upon these variables a decision tree classifier was made in "R" (version 3.4.4) using the CART algorithm(1).

Results

SR could be differentiated from APDs based on P wave morphology in leads I, V2 and aVL with an accuracy of 97.7%. The P wave morphology of lead V3 allowed differentiation between left (negative P) and right atrium (positive P) with an accuracy of 83.8%. Differentiation between different locations within the atria could be done with an accuracy of 100% for the left atrium and 79.2% for the right atrium.

Conclusion

12-lead ECG might have an added value in predicting the site of origin of APDs in horses. More data are needed to further fine-tune and validate the algorithm.

References

1. Breiman L, Friedman JH, Olshen RA, C.J. S. Classification and Regression Trees. Belmont: Wadsworth International Group; 1984.