



Echocardiographic assessment of right ventricular systolic function in conscious healthy dogs following a single dose of pimobendan versus atenolol

Lance C. Visser, DVM, MS^{a,1}, Brian A. Scansen, DVM, MS^{a,*},
Nicole V. Brown, MS^b, Karsten E. Schober, DVM, PhD^a,
John D. Bonagura, DVM, MS^a

^a Department of Veterinary Clinical Sciences, College of Veterinary Medicine, The Ohio State University, 601 Vernon Tharp Street, Columbus, OH 43210, USA

^b Department of Biomedical Informatics, The Ohio State University, 2012 Kenny Road, Columbus, OH 43221, USA

Received 31 July 2014; received in revised form 1 April 2015; accepted 13 April 2015

KEYWORDS

Canine;
Cardiac;
Echocardiography;
Ultrasound

Abstract Objective: To quantify drug-induced changes in right ventricular (RV) systolic function after administration of pimobendan and atenolol.

Animals: 80 healthy privately-owned dogs.

Methods: Using a prospective, blinded, fully-crossed study design with randomized drug administration, RV systolic function was determined twice at two time periods; before and 3 h after administration of pimobendan (0.25 mg/kg PO) or atenolol (1 mg/kg PO). Indices of RV systolic function included tricuspid annular plane systolic excursion (TAPSE), fractional area change (FAC), pulsed-wave tissue Doppler-derived systolic myocardial velocity of the lateral tricuspid annulus (S'), and speckle-tracking-derived global longitudinal RV free wall strain and strain rate. The effect of treatment on percent change from baseline RV function was analyzed with a linear mixed model including the covariates heart rate, body weight, age, gender, drug sequence, and time period.

Presented in abstract form as an oral presentation at the 2014 American College of Veterinary Internal Medicine Forum, Nashville, TN, USA.

* Corresponding author.

E-mail address: scansen.2@osu.edu (B.A. Scansen).

¹ Dr. Visser's current address: Department of Medicine & Epidemiology, School of Veterinary Medicine, University of California-Davis, Davis, CA, USA.

Results: All indices showed a significant ($p < 0.0001$) increase and decrease from baseline following pimobendan and atenolol, respectively. Significant differences from baseline were attributed to drug treatment ($p < 0.0001$); whereas, effects of other covariates were not significant. The greatest percent changes, but also highest variability, were observed for S' and strain rate ($p < 0.0001$). Post-atenolol, a significantly greater proportion of dogs exceeded the repeatability coefficient of variation for FAC and S' compared to TAPSE ($p \leq 0.007$).

Conclusions: Echocardiographic indices in healthy dogs tracked expected changes in RV systolic function following pimobendan and atenolol and warrant study in dogs with cardiovascular disease.

© 2015 Elsevier B.V. All rights reserved.

Abbreviations

2D	two-dimensional
CMR	cardiac magnetic resonance
EF	ejection fraction
FAC	fractional area change
RV	right ventricular
RVA _D	right ventricular area at end-diastole
RVA _S	right ventricular area at end-systole
S'	pulsed wave tissue Doppler imaging-derived systolic myocardial velocity of the lateral tricuspid annulus
SD	standard deviation
STE	speckle tracking echocardiography
TAPSE	tricuspid annular plane systolic excursion
TDI	tissue Doppler imaging

Introduction

The clinical assessment of right ventricular (RV) systolic function is underdeveloped and has largely been ignored in dogs. In contrast, the quantitative assessment of RV function in people is useful for clinical decision-making and provides prognostic data for those affected with right heart-specific diseases,¹ as well as left heart-specific diseases including mitral and aortic valve disease^{2–4} and idiopathic dilated cardiomyopathy,^{5–10} often independent of pulmonary hypertension status. Similar diseases affect dogs; therefore, a study investigating the quantitative assessment of canine RV function is warranted.

Echocardiography is the most practical method for assessment of RV structure and function, though is limited by load-dependence, coarse trabeculae, and subdivided anatomy that is less amenable to geometric shape assumptions.¹¹ Despite these challenges, physicians utilize a

number of echocardiographic indices of RV function, each with inherent advantages and disadvantages that have been validated against a gold standard. These indices include M-mode-derived tricuspid annular plane systolic excursion (TAPSE), the 2-dimensional (2D) surrogate of RV ejection fraction (EF) – RV percent fractional area change (FAC), tissue Doppler imaging (TDI)-derived systolic myocardial velocity of the lateral tricuspid annulus (S'), and speckle-tracking echocardiography (STE)-derived systolic longitudinal RV strain and strain rate.^{12–16}

Echocardiographic indices of RV systolic function may be useful for the identification and quantification of RV dysfunction in the dog, but studies attempting to validate these indices are needed. This study evaluated 5 echocardiographic indices of RV systolic function in the conscious healthy dog over 3 contractile states (baseline, increased and decreased function). Specifically, the objective of this study was to determine if TAPSE, FAC, S' , global longitudinal RV free wall STE-derived strain and strain rate could track anticipated changes in RV systolic function following a single oral dose of pimobendan and atenolol in dogs. We hypothesized that the proposed echocardiographic indices can be acquired and used to detect changes in RV systolic function following the administration of pimobendan (expected to increase systolic function) and atenolol (expected to decrease systolic function) in conscious healthy dogs.

Animals, materials and methods

All procedures in this study were approved by the Institutional Animal Care and Use Committee and the Veterinary Medical Center Clinical Research and Teaching Advisory Committee at The Ohio State University. Written consent authorizing

Download English Version:

<https://daneshyari.com/en/article/2400042>

Download Persian Version:

<https://daneshyari.com/article/2400042>

[Daneshyari.com](https://daneshyari.com)