



Evaluation of red blood cell distribution width in cats with hypertrophic cardiomyopathy

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KEYWORDS

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Abstract *Background:* Red blood cell distribution width (RDW) is a measurement of variability in circulating erythrocytes size, and has recently been shown to correlate with prognosis in a variety of human diseases, including acute and chronic heart failure.

Objectives: To determine if RDW differs between healthy controls, cats with hypertrophic cardiomyopathy (HCM) without congestive heart failure (CHF) and cats with HCM and CHF, and to evaluate whether RDW values at presentation can provide useful prognostic information in cats with HCM.

Animals: Retrospective single-centre study. Seventy-three cats diagnosed with HCM by echocardiography and 30 healthy controls presented to a veterinary teaching hospital between October 2006 and April 2013 were included. Physical examination, haematology and echocardiographic data obtained on one single visit were retrospectively reviewed and compared between three groups: controls, cats with HCM without CHF, and cats with HCM and CHF. Outcome data were obtained from clinical records or referring veterinarians. Univariable and multivariable survival analyses were performed.

Results: Red blood cell distribution width was significantly greater in cats with HCM and CHF compared with cats with HCM without CHF, and the controls. It was also significantly associated with cardiac mortality in univariable survival analysis, and this association remained significant in multivariable survival analysis after control-

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ling for the effect of CHF, left atrial size, left ventricular systolic function, haematocrit and pro-thrombotic state.

Conclusions: A higher RDW may be seen in cats with CHF and is an independent predictor of cardiac death in cats with HCM without concurrent non-cardiac-related illness.

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Abbreviations

2D	two-dimensional
ATE	arterial thromboembolism
CBC	complete blood count
CHF	congestive heart failure
95% CI	95% Confidence Interval
HCM	hypertrophic cardiomyopathy
LA:Ao	ratio of diastolic left atrial diameter to aortic root diameter
LVFS%	left ventricular fractional shortening
Max LVWd	maximal 2D end-diastolic left ventricular septal or free wall thickness
RDW	red blood cell distribution width

Introduction

Red blood cell distribution width (RDW) is a measurement of the heterogeneity of red blood cell size distribution data and is routinely reported by automated haematology analysers.¹ Red blood cell distribution width is defined as the coefficient of variation of the red blood cell size²; it has historically been used for the classification of anaemia. Recently, however, RDW has been correlated with prognosis in a variety of different human diseases, including acute and chronic heart failure,^{3–10} with an increase in RDW values associated with a decrease in survival time. The proposed mechanisms for the alteration of RDW in these patients include: inflammatory stress, nutritional deficiencies, impaired iron metabolism, inadequate production of erythropoietin, and the impact of comorbidities.^{8,11,12}

Hypertrophic cardiomyopathy (HCM) is the most common cardiac disease in cats, and several negative prognostic factors associated with decreased survival time have been identified, including the presence of: arterial thromboembolism, congestive heart failure, left atrial dilation, left ventricular and left atrial systolic dysfunction, extreme ventricular hypertrophy and elevation in cardiac biomarkers.^{13–17}

Red blood cell distribution width has been investigated in veterinary patients as an index of regenerative anaemia,^{18,19} and in dogs with mitral valve disease²⁰ and pulmonary hypertension^{a,21}; however, no association between RDW and outcome was established in these studies. To date, there have been no publications evaluating RDW as a prognostic indicator in feline patients.

The aims of this study were to determine if RDW differs between healthy controls, cats with HCM and cats with HCM in congestive heart failure (CHF), and whether RDW values at presentation can provide useful prognostic information for feline patients with HCM. The hypothesis was that RDW would be higher in cats with HCM compared with the controls, and that higher RDW would be independently associated with cardiac death.

Animals, materials and methods

The electronic medical record system of the Queen Mother Hospital for Animals, Royal Veterinary College, was retrospectively searched for feline patients diagnosed with HCM between October 2006 and April 2013. Patients were selected if they had a full echocardiographic examination and haematology analysis submitted during the same visit or hospitalisation period. Data collected from medical record included: signalment, presenting clinical signs, physical examination findings, serum biochemistry results, haematology analysis and thoracic radiographs, when available.

Hypertrophic cardiomyopathy was defined as an end-diastolic left ventricular wall thickness ≥ 6 mm on two-dimensional (2D) echocardiography in the absence of haemodynamic or metabolic causes of hypertrophy (such as systemic hypertension, fixed aortic stenosis, hyperthyroidism, acromegaly) based on appropriate tests performed during the diagnostic or treatment regime.^{22,23} Echocardiographic

^a Poser H, Mazzotta E, Menciotti G, Contiero B, Baron Toaldo M, Guglielmini C. Red blood cell distribution width in dogs with pre-capillary and post-capillary pulmonary hypertension. Poster presented at the American College of Veterinary Internal Medicine Forum, June 12–15 2013, Seattle, Washington, USA.

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