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Acute resolution of pulmonary alveolar infiltrates in 10 dogs with pulmonary hypertension treated with sildenafil citrate: 2005—2014☆

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Abstract *Objective:* To describe clinical canine patients with naturally occurring pulmonary hypertension and radiographic pulmonary alveolar infiltrates before and after treatment with sildenafil.
Animals: Ten client-owned dogs.
Methods: A retrospective analysis of dogs with echocardiographically-determined pulmonary hypertension and pulmonary alveolar infiltrates on thoracic radiographs was performed before (PRE) and after (POST) sildenafil therapy. Clinical scores, pulmonary alveolar infiltrate scores and tricuspid regurgitation gradients were analyzed PRE and POST sildenafil.

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Results: Pulmonary alveolar infiltrates associated with pulmonary hypertension developed in a diffusely patchy distribution (10/10). Sixty percent of dogs had a suspected diagnosis of interstitial pulmonary fibrosis as the etiology of pulmonary hypertension. Median PRE clinical score was 4 (range: 3—4) compared to POST score of 0 (0—2) ($p = 0.005$). Median alveolar infiltrate score PRE was 10 (5—12) compared to POST score of 4 (0—6) ($p = 0.006$). Median tricuspid regurgitation gradient PRE was 83 mmHg (57—196) compared to 55 mmHg POST (33—151) ($p = 0.002$).
Conclusions: A subset of dogs with moderate to severe pulmonary hypertension present with diffuse, patchy alveolar infiltrates consistent with non-cardiogenic pulmonary edema. The typical clinical presentation is acute dyspnea and syncope, often in conjunction with heart murmurs suggestive of valvular insufficiency. This constellation of signs may lead to an initial misdiagnosis of congestive heart failure or pneumonia; however, these dogs clinically and radiographically improve with the initiation of sildenafil.

Abbreviations

Ao	aorta
HAPE	high altitude pulmonary edema
IPF	interstitial pulmonary fibrosis
LA	left atrium
MR	mitral regurgitation
PH	pulmonary hypertension
POST	post-sildenafil treatment
PRE	pre-sildenafil treatment
sPAP	systolic pulmonary artery pressure
TR	tricuspid regurgitation
VHS	vertebral heart score

Introduction

Pulmonary hypertension (PH) is sequelae to multiple disease processes and is primarily diagnosed in older, small breed dogs. Pulmonary hypertension can be classified as increased pre-capillary resistance (pulmonary arterial hypertension) or increased post-capillary resistance (pulmonary venous hypertension) and the causes of PH are numerous and associated with a multitude of different diseases.[1—16] The clinical presentation of dogs with PH includes cough, exercise intolerance, respiratory distress, and/or syncope.[1,2] This presentation is similar to, and maybe mistaken for, primary respiratory pathology and/or congestive heart failure. For this reason, many dogs with abnormal clinical signs resulting from PH are treated for primary respiratory infection or airway inflammation with antibiotics and steroids, and diuretics for congestive heart failure.

The diagnosis of PH in the clinical canine population is made echocardiographically and defined as an estimated pulmonary arterial systolic pressure greater than 30 mmHg.[17] Thoracic radiographs are often evaluated and frequently demonstrate the consequences of long-term PH, including pulmonary arterial and right-sided heart enlargement. In veterinary medicine, pulmonary alveolar infiltrates are often the result of left-sided heart failure or pneumonia and not typically thought to be associated with PH. However, in humans, PH associated with high altitude exposure can result in patchy pulmonary edema and radiographic infiltrates. Treatment with sildenafil citrate[d] improves these patients' PH severity, pulmonary edema and adverse clinical signs.[18] The occurrence of pulmonary alveolar infiltrates associated with PH in dogs is not well described in the scientific literature and may be an under-recognized clinical feature of PH. The purpose of this study was to describe a series of dogs with naturally occurring PH and radiographic alveolar infiltrates before and after treatment with sildenafil.

Materials and methods

Medical records from the teaching hospital of the University of Wisconsin School of Veterinary Medicine were reviewed for canine patients with concurrent radiographic evidence of pulmonary alveolar infiltrates, moderate to severe pulmonary hypertension based on echocardiographic examination, and treatment with sildenafil citrate from June 2005 through March 2014. Inclusion criteria

[d] Viagra and Revatio, Pfizer US Pharmaceuticals, New York, NY, USA.