

Echocardiographic evaluation of pulmonary hypertension in dogs with heartworm disease using the pulmonary vein to pulmonary artery ratio.

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Introduction

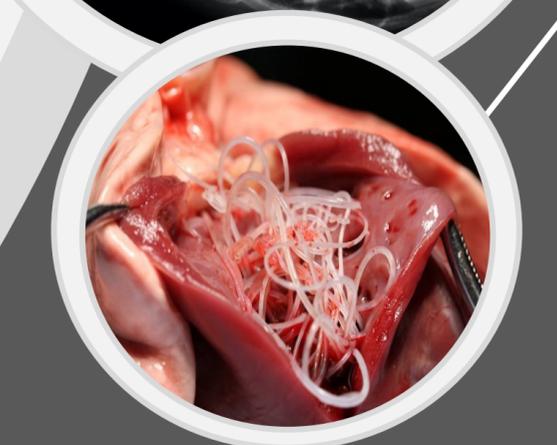
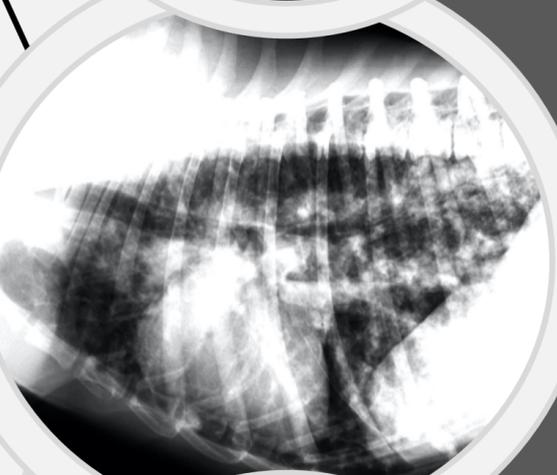
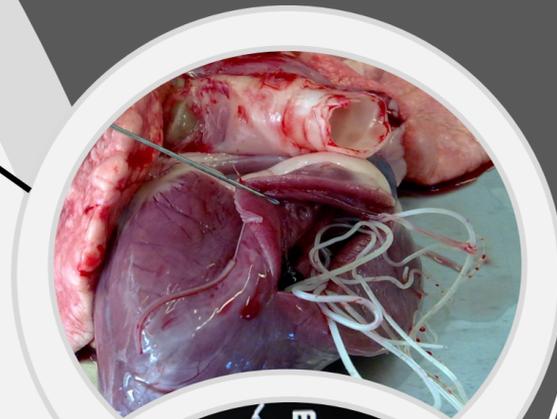
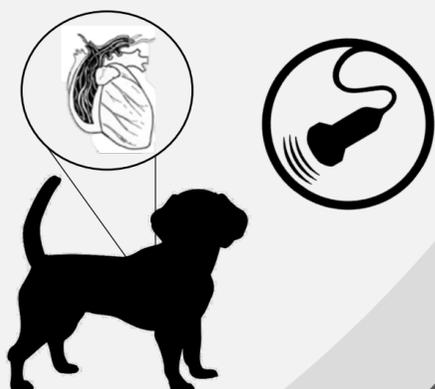
Dirofilaria immitis (*D. immitis*) is a nematode that produces proliferative pulmonary endarteritis in dogs due to direct contact of the adult parasites with the intima layer of the pulmonary arteries. The vascular lesions lead to an irreversible structural damage and a sustained pulmonary hypertension (PH) which can produce dyspnea, exercise intolerance, cough, or even right heart failure^[1].

Objective

The purpose of this study was to assess the diagnostic value of the pulmonary vein to pulmonary artery ratio (PV:PA ratio) measure [2] obtained by echocardiography to determine moderate or severe PH (>55mmhg) in dogs with heartworm disease.

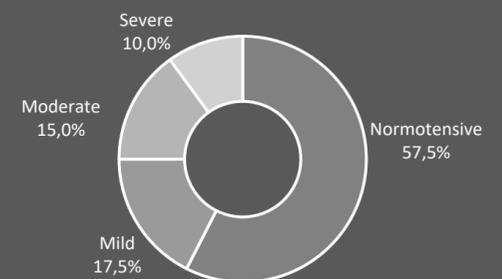
Material & methods

29 heartworm-infected dogs (group A) and 11 healthy dogs (group B) were included in the study. Based on the Right Pulmonary Artery Distensibility index (RPAD index), PH was present in 58.6% of dogs infected by *D. immitis* (group A). The PV/PA ratio was measured by M mode and 2D mode, and compared with the RPAD index (Gold Standard) and with other alternative measures for estimation of PH (Main pulmonary Artery to Aorta ratio, worm load score and the PV/PA ratio via x-ray) to value their sensitivity and specificity in the detection of PH.

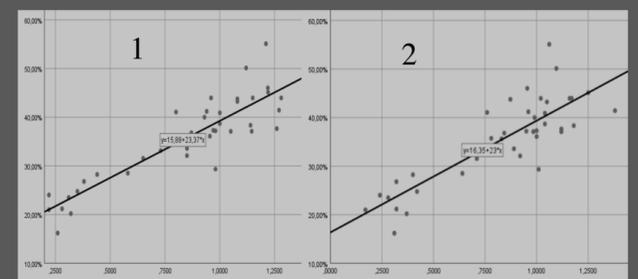


Results

The statistical study of the results showed a high positive correlation between RPAD index and AP/VP ratio, with a sensitivity and specificity of 1.00.



Graphic 1. Results of PH Status (RPAD index).



Graphic 2. Results of RPAD index (Gold standard) R2 Linear Regression: (1) PV:PA ratio M mode; (2) PV:PA ratio 2d mode.

Method	AUC	IC 95%	Cut off	Se	Es	YOUDEN index (Se+Es-1)
PV:PA Ratio x-ray	0.903	(0.806, 1.000)	<=0,8992	0.80	0.87	0.67
PV:PA Ratio M mode	1.000	(1.000, 1.000)	<=0.615	1.00	1.00	1.00
PV:PA Ratio 2d mode	1.000	(1.000, 1.000)	<=0.675	1.00	1.00	1.00
MPA/Ao Ratio	0.962	(0.909, 1.000)	>=1,1150	1.00	0.87	0.87
Worm load score	0.793	(0.652, 0.934)	>=2,50	0.80	0.67	0.47
RPAD index	1.000	(1.000, 1.000)	<=28.9%	1.00	1.00	1.00

Table 1. ROC Curve results of the 6 methods to study the event of suffering from pulmonary hypertension (> 55 mm Hg).

Conclusion

The PV/PA ratio may be useful as a complementary diagnostic method for the determination of moderate or severe PH in dogs with *D. immitis*, when the measure is ≤ 0.615 measured as M mode and ≤ 0.675 measured as 2D Mode. However, further research with a greater number of dogs must be carried out to confirm these results.

References

1. Falcón-Cordón *et al.*, 2019 J Vet parasitol. 273: 1-4.
2. Biretoni *et al.*, 2016 J Vet Cardiol. 18: 326-335.