

Missed murmurs: hiding in plain sight

Background

- Cardiac auscultation is recommended to screen for congenital heart disease and annually to screen for acquired heart disease, such as myxomatous mitral valve disease (MMVD).¹
- Timely detection of heart murmurs in both puppies and adult dogs enables investigation into whether there is an underlying pathology which may require intervention.

Every second murmur is missed by recent graduate vets²

PAPER 1:

Methods

- 57 Cavalier King Charles Spaniels with mild to moderate mitral valve regurgitation.
- 6 veterinarians with varying levels of experience did cardiac auscultations.
- Findings were compared to Doppler echocardiography and phonocardiograms (ground truth).

Results

- **Missed murmurs:**
 - 38–62% by recent graduates (<1 year)
 - 12–21% by cardiologists

First-opinion vets did not record 96/97 soft murmurs in puppies³

PAPER 2:

Methods and results

- Compared auscultation of 331 apparently healthy puppies by first-opinion veterinarians vs. by a cardiologist.

1/4 to 3/4 of systolic murmurs were missed by recent graduates⁴

PAPER 3:

Methods

- Compared 51 vet students, 62 recent graduates, 10 referral hospital vets and 5 cardiologists.
- Recordings and phonocardiograms from 11 dogs and cats (diagnosis by cardiologist).

Results

- No difference between auscultation skills of recent veterinary graduates and final-year veterinary students.
- Murmur detection rate is higher in observers with more experience (Table 1).

Murmur type	Vet student	Recent graduate	Referral vet	Cardiologist	p-value
Loud systolic	76%	84%	90%	100%	0.15
Systolic	31%	24%	50%	60%	0.63
Continuous	31%	34%	70%	40%	0.12
Harsh holosystolic	57%	60%	90%	80%	0.21
Loud diastolic	59%	65%	70%	100%	0.36

Table 1: Murmur detection rate in observers with different experience levels.

Conclusions of publications

- Rates of murmur detection depends on observer experience.
- Veterinary students and inexperienced practitioners may miss murmurs in puppies and adult dogs.
- Training is needed to prevent murmurs from being missed.

Training and AI tools may help prevent murmurs from being missed.



References: 1. Luis Fuentes, V., Abbott, J., Chetboul, V., Cote, E., Fox, P.R., Haggstrom, J., Kittleson, M.D., Schober, K., Stern, J.A., 2020. ACVIM consensus statement guidelines for the classification, diagnosis, and management of cardiomyopathies in cats. *J Vet Intern Med* 34, 1062-1077. 2. Pedersen HD, Haggstrom J, Falk T, et al. Auscultation in mild mitral regurgitation in dogs: observer variation, effects of physical maneuvers, and agreement with color Doppler echocardiography and phonocardiography. *J Vet Intern Med* 1999;13:56-64. 3. van Staveren MDB, Szatmari V. Detecting and recording cardiac murmurs in clinically healthy puppies in first opinion veterinary practice at the first health check. *Acta Vet Scand* 2020;62:37. 4. Mullaney D, Fuentes VL, Barfield D. Cardiac auscultation skills in final year veterinary students and recent veterinary graduates, referral hospital veterinary surgeons and veterinary cardiologists or cardiology residents. *Vet Rec* 2021;189:e305.