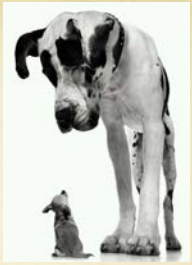

Your pet has a murmur!

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Murmur diagnosis in cats

- Heart disease diagnosis in cats and kittens in general is challenging because:
  - Approximately ½ of systolic cardiac murmurs in cats are benign
  - Approximately ½ of cats with heart disease do not have murmurs
  - Therefore, screening for heart disease by murmur presence alone is not particularly useful
- Additional findings supportive of underlying heart disease
  - Gallop sound
  - Historic signs consistent with heart disease

Reasons to work up the murmur in a cat

- Owner wants a definitive answer of the underlying cause of the murmur
- Animal may be bred
- Murmur is continuous, diastolic or ≥ grade IV/VI
- Additional historical or clinical signs are present suggestive of heart disease
  - Gallop sound
  - Arrhythmia

Reasons to consider wait and watch approach

- Financial
- Owners would not return it anyway (if newly acquired)
- Murmurs that come and go at different exams are usually flow murmurs and more likely to be benign.
- Murmurs that disappear at lower heart rates are usually flow murmurs and more likely to be benign.

Feline heart sounds

Thoracic radiograph findings

- Normal heart size
  - An echocardiogram to determine the definitive cause of the murmur is the gold standard
  - If an echocardiogram cannot be pursued, thoracic radiographs still yield useful information
    - Early heart disease may still be present, but heart disease significant enough to cause heart enlargement is unlikely
    - If heart enlargement is detected, an echocardiogram is particularly useful to diagnose the type of heart disease
  - Educate owner about disease progression and general recommendations

Murmur diagnosis in dogs

- Unlike cats, a murmur is present in most forms of heart disease in dogs
- Dogs can also develop physiologic or benign murmurs, especially puppies
- The murmur is **likely** to be pathologic if it is:
  - Continuous
  - Diastolic
  - ≥ grade IV/VI

Considerations in a puppy with a cardiac murmur

- What are the local puppy lemon laws?
- Do owners plan to breed the dog or is it a pet?
- What is the murmur character?
  - Continuous, diastolic or systolic murmurs with an intensity of Grade IV/VI or louder are nearly always pathologic.
  - Systolic murmurs that are softer than a grade IV/VI may be "puppy" or benign murmurs. Most, but not all benign murmurs will be outgrown by the time the puppy is 4 months old.

If the owners determine to proceed with an echocardiogram, it is reasonable to pursue an echocardiogram prior to ECG and thoracic radiographs. These diagnostics may offer useful ancillary information but often cannot provide a definitive diagnosis of the murmur

Reasons to work up the murmur

- Owner wants a definitive answer of the underlying cause of the murmur
- Animal may be bred
- Murmur persists after the dog is older than 4 months
- Murmur is continuous, diastolic or loud (≥ grade IV/VI)

Reasons to consider wait and watch approach

- Financial
- Owners would not return the animal anyway (if newly acquired)
- Murmur is low intensity (≤grade IV/VI) and may be a flow murmur
- If the murmur disappears by the time the dog is 4 months of age, it was a benign puppy murmur and no further evaluation is warranted.
- If the murmur remains:
  - Thoracic radiographs give information regarding underlying cause and prognosis
  - Echocardiography gives definitive diagnosis

Considerations in an adult dog with a cardiac murmur

- Is this a new murmur or could it have been missed previously?
- What is the breed?
  - Small breed dogs>>>degenerative valve disease until proven otherwise
  - Medium to large breed dogs>>>degenerative valve disease vs. dilated cardiomyopathy

Considerations in an adult dog **small breed** dog with a cardiac murmur

- What is the murmur character?
  - In an asymptomatic dog with a grade I-II/VI systolic murmur that is typical of degenerative mitral valve disease, it is reasonable to hold off on diagnostics, but educate the owner about heart disease and clinical signs that should prompt re-exam
    - Auscultation at yearly exams
  - If the murmur is grade III/VI or louder, or if it is not typical of degenerative mitral valve disease, staging of heart disease (including thoracic radiographs) is warranted.

If dog is symptomatic for heart disease or an arrhythmia is present (other than sinus arrhythmia), then an echocardiogram should be recommended.

Thoracic radiograph findings

- Signalment and physical exam findings consistent with degenerative valve disease>>>stage disease (B1 or B2 and treat accordingly)
- Increased heart size in a pattern NOT consistent with mitral valve disease (for example right heart enlargement or generalized cardiomegaly)
  - Echocardiogram highly recommended to definitively diagnose disease and develop a specific treatment/monitoring plan

Considerations in an adult dog **medium or large breed** dog with a cardiac murmur

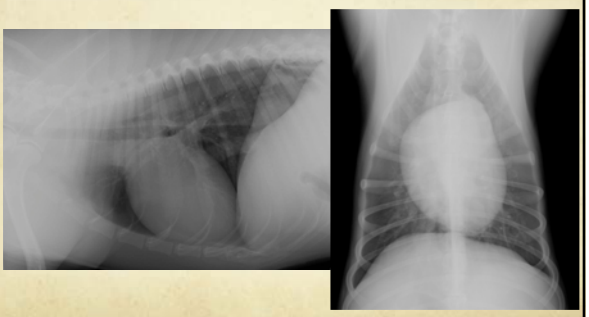
- What is the murmur character?
  - In medium to large size dogs, it is more difficult to differentiate dilated cardiomyopathy from degenerative valve disease and echocardiography is recommended
  - Clues to help determine the underlying disease:

	DCM	DVD
	Softer intensity murmur	coarser murmur ± thrill
	Pulses more likely to be weak	pulses weak late in disease
	Radiographic findings:	
	Generalized heart enlargement	Primarily left atrial enlargement

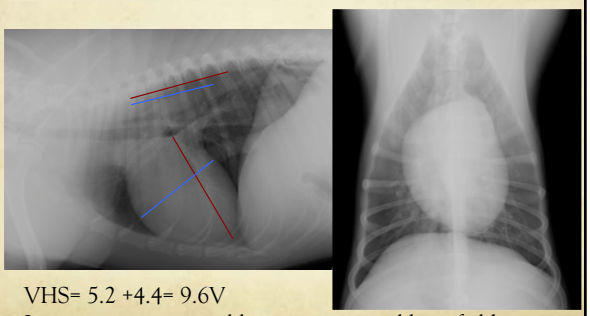
Case 1

- 10 year old Yorkshire terrier with a new murmur (left apical, systolic, grade III/VI murmur) during routine physical examination.
- Diagnosis: degenerative valve disease until proven otherwise
- Recommendations: thoracic radiographs and blood pressure to stage disease

Case 1 thoracic radiographs



Case 1 thoracic radiographs



VHS= 5.2 +4.4= 9.6V
Interpretation: normal heart size; normal lung fields

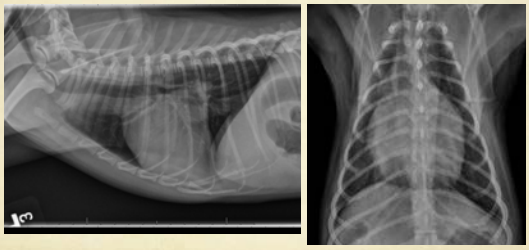
Case 1

- Systolic blood pressure: 130 mmHg
- Diagnosis: Stage B1 valvular heart disease
- Recommendations
  - No cardiac drugs recommended
  - Monitor heart size with yearly thoracic radiographs
  - Monitor blood pressure yearly
  - Discuss the potential clinical signs associated with heart disease although the patient is currently at low risk
  - Consider a fish oil supplement

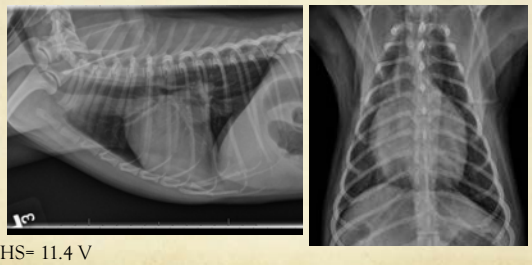
Case 2

- 10 year old toy poodle with a new murmur (left apical, systolic, grade III/VI murmur) during routine physical examination.
- Diagnosis: degenerative valve disease until proven otherwise
- Recommendations: thoracic radiographs and blood pressure to stage disease

Case 2 thoracic radiographs



Case 2 thoracic radiographs



VHS= 11.4 V
Interpretation: mild to moderate heart enlargement (primarily the left atrium). Lung fields clear.

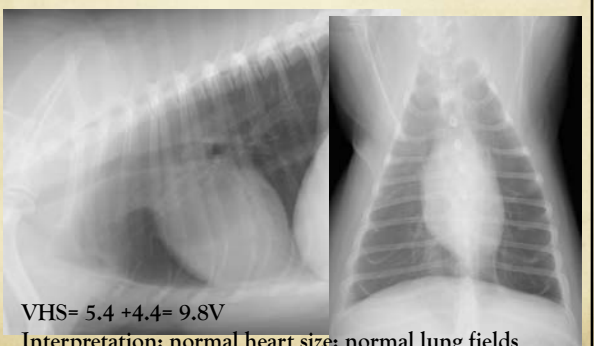
Case 2

- Systolic blood pressure: 180 mmHg
- Diagnosis: Stage B2 valvular heart disease; possible systemic hypertension
- Monitoring recommendations
  - Further evaluate possibility of systemic hypertension
  - Consider echocardiography to confirm whether EPIC criteria are met
  - Evaluate heart size with thoracic radiographs every 6 months
    Treatment recommendations
    - Fish oil supplementation if not already started
    - Possibly pimobendan and/or amlodipine
    - More complete client education:, avoid high salt treats, begin maintaining a resting respiratory log

Case 3

- 10 year old Australian shepherd with a new murmur (left apical, systolic, grade III/VI murmur) during routine physical examination.
- Diagnosis: degenerative valve disease vs. dilated cardiomyopathy
- Recommendations:
  - +/- thoracic radiographs
  - blood pressure
  - +/- echocardiography

Case 3 thoracic radiographs



VHS= 5.4 +4.4= 9.8V
Interpretation: normal heart size; normal lung fields

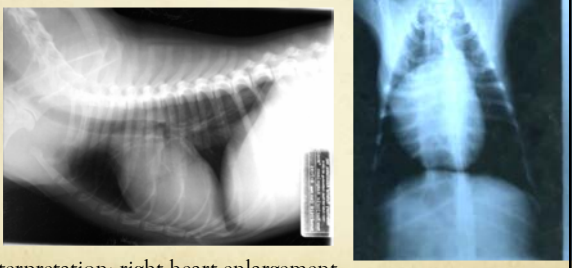
Case 3

- Systolic blood pressure: 140 mmHg
- Diagnosis: Stage B1 heart disease (valvular vs. dilated cardiomyopathy)
- Recommendations
  - Echocardiogram would allow definitive diagnosis, but DCM is less likely than DVD
  - Evaluate heart size with thoracic radiographs every 12
  - No cardiac medications
  - Fish oil supplement
  - Client education

Case 4

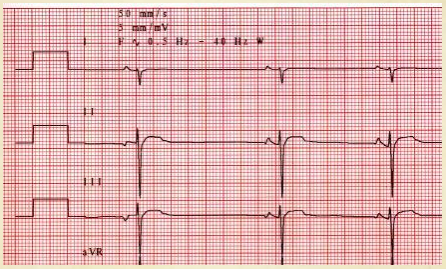
- 2 year old mixed breed dog with a murmur (left heart base, systolic, grade V/VI murmur) during routine physical examination after being adopted.
- Diagnosis: Sub-aortic stenosis vs. pulmonic stenosis
- Recommendations: thoracic radiographs vs. electrocardiogram vs. echocardiography

Case 4 thoracic radiographs



Interpretation: right heart enlargement, hypoperfused lung fields and dilated main pulmonary artery

Case 4 Electrocardiogram



Interpretation: Sinus arrhythmia with right axis shift

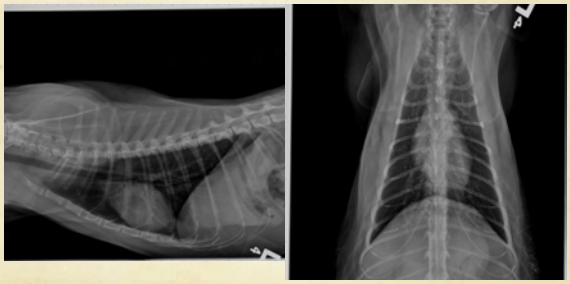
Case 4

- Diagnosis: Presumptive pulmonic stenosis
- Recommendations
  - Echocardiogram would allow diagnosis of disease severity and whether the patient is a candidate for surgical intervention
  - Client education

Case 5

- 8 year old DSH with a grade III/VI left and right parasternal murmur which has not previously been detected
  - Murmur intensity decreases when heart rate slows
- Diagnosis: physiologic flow murmur vs. cardiomyopathy
- Recommendations:
  - blood pressure and T_4
  - thoracic radiographs vs. echocardiography

Case 5 thoracic radiographs



Interpretation: VHS-7.8V; Normal heart size and clear lung fields

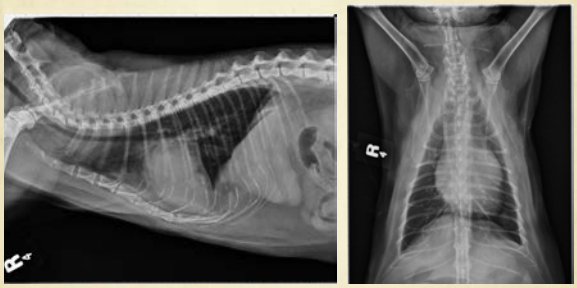
Case 5

- Systolic blood pressure: 128 mmHg
- T_4: 3.1µg/dl
- Diagnosis: Physiologic flow murmur vs. early cardiomyopathy
- Recommendations
  - No cardiac drugs recommended
  - Fish oil supplement
  - Echocardiogram would allow definitive diagnosis but is unlikely to change the treatment plan, therefore potential follow up could be regular thoracic radiographs or echocardiography
  - Client education

Case 6

- 10 year old DSH with a grade III/VI left and right parasternal murmur, which has not previously been detected
- Diagnosis: physiologic flow murmur vs. cardiomyopathy
- Recommendations:
  - blood pressure and T_4
  - thoracic radiographs vs. echocardiography

Case 6 thoracic radiographs



Interpretation: VHS= 9.6V; Generalized heart enlargement, particularly left atrium; Clear lung fields

Case 6

- Systolic blood pressure: 142 mmHg
- T_4: 2.8µg/dl
- Diagnosis: presumptive cardiomyopathy; no evidence of congestive heart failure
- Recommendations
  - Echocardiogram would allow definitive diagnosis of cardiomyopathy type and is highly recommended
  - If an echocardiogram is not possible, treat presumptively for cardiomyopathy with diastolic dysfunction (more common that systolic dysfunction in cats)
    - Fish oil supplementation
    - Heart rate control if necessary
      - Atenolol or diltiazem
    - Anticoagulants
      - Clopidogrel vs. Aspirin
    - General client education
      - Resting respiratory log

Summary in adult dogs

- Echocardiogram is most important when disease other than degenerative valve disease may be present
  - Murmur is not typical of DVD
  - Patient signalment is not "classic for DVD"

OR

- Degenerative valve disease is advanced and complications such as pulmonary hypertension are more likely to be present

Summary in adult cats

- Murmurs are often benign in cats
- Additional clinical signs supportive of primary heart disease include gallop sounds and cardiac arrhythmias
- If the VHS is ≤ 8V, **significant** primary heart disease is unlikely
- Echocardiography is the gold standard for determining the underlying form of heart disease
- There is no clear evidence that beginning cardiac medications prior to congestive heart failure alters progression of disease.

Summary in juvenile animals

- Echocardiogram is most important when:
  - A cardiac thrill is present
  - The murmur is continuous or diastolic
  - Diagnosis will determine if the animal is returned
  - The animal may be used for breeding purposes
  - Surgical intervention is a possibility
- If the murmur is intermittent or changes with heart rate, it is more likely to be a benign murmur

Questions?

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