

Management of Incidentally-detected Heart Murmurs in Dogs and Cats

Meg M. Sleeper VMD, DACVIM (cardiology)

Professor of Cardiology; University of Florida School of Veterinary Medicine

Gainesville, FL USA

Introduction

Cardiac murmurs are usually associated with turbulent or high velocity blood flow in the heart or great vessels. A quiet environment is essential for successful auscultation. Extraneous sounds, such as panting or purring, can make auscultation very difficult in some patients. Restraining the animal near a sink with slowly running water or placing a cotton ball soaked with alcohol near the cat's face can sometimes be used to stop purring. Occasionally, breath sounds or fur rubbing against the stethoscope can be mistaken for sounds originating from the heart. Careful auscultation while watching the dog or cat's breathing pattern can be useful to differentiate heart sounds from breath sounds.

It is very important that complete auscultation is performed. A simple approach is to auscult the left heart base, under the triceps musculature, which is the region of the aortic and pulmonic valve areas and the left apex, which is the mitral valve area. The right heart base and apex should also be ausculted. The right apex, is the area over the tricuspid valve area and tricuspid leaks are usually loudest in this region. Murmurs associated with ventricular septal defects are usually loudest at the right heart base.

Cardiac murmurs are most often caused by the vibrations associated with high velocity, disturbed and turbulent blood flow. Such disturbances may be caused by valvular incompetence, valvular stenosis or the presence of a shunt. Disturbed flow that is low velocity, such as pulmonic valve regurgitation, may not be auscultable. However, pulmonic valve regurgitation is rarely clinically important. Murmurs can also be created by other physiologic or pathological processes. For example, murmurs are often heard with changes in the viscosity of blood (anemia) and high output diseases such as hyperthyroidism can be associated with the development of murmurs due to increased velocity of ejected blood.

Murmurs are classified in several ways:

Timing in the cardiac cycle (systolic, diastolic, continuous). While most common cardiovascular diseases in small animals result in systolic murmurs, occasionally feline patients will present with diseases such as mitral stenosis (which results in a diastolic murmur) and a patent ductus arteriosus results in a continuous cardiac murmur.

Intensity is the loudness of the murmur most often using a 6-tier scale. The intensity of the murmur does not necessarily correlate with the severity of the underlying heart disease as some well

tolerated abnormalities (such as restrictive ventricular septal defects) produce very loud murmurs, while some severe lesions may produce soft murmurs (i.e. unrestrictive ventricular septal defect or severe tricuspid regurgitation).

Point of maximal intensity (PMI) is the area at which the murmur is loudest, and it generally relates closely to the underlying source of turbulent flow. For example, a left to right patent ductus arteriosus murmur is usually heard loudest over the left heart base at the pulmonary artery, because high velocity flow from the aorta is shunting through the duct into the pulmonary artery. If the murmur is loud on auscultation over the entire chest, the presence of a precordial thrill will identify the PMI.

Radiation of a murmur refers to how widely the murmur can be heard from the point of maximal intensity. Generally, the wider the radiation of the murmur, the more severe the lesion.

Pitch and quality are subjective descriptions of the character of a murmur (i.e. coarse, musical, etc). These descriptors are not precise and do not have the same objectivity as timing and point of maximal intensity.

Certain murmurs are pathognomonic for specific diseases. For example, a continuous murmur at the left heart base is almost always a patent ductus arteriosus (although rarely an aortic-pulmonary window or an AV fistula can produce a similar murmur). Similarly, a systolic murmur with a point of maximal intensity at the right heart base is usually associated with a ventricular septal defect.

Specific considerations in the feline patient

It is often impossible to differentiate innocent (benign) murmurs from those murmurs secondary to significant heart disease based on auscultation alone, particularly in the cat where innocent murmurs are very common. Benign dynamic right ventricular outflow tract stenosis is an important and common cause of innocent murmurs in cats. In the author's experience, soft (\leq grade 4/6), musical quality murmurs at the heart base, which disappear at slower heart rates are more likely to be innocent, particularly if thoracic radiographs reveal a normal heart size. While ausculting the feline patient, it is often possible to slow the heart rate by covering the cat's face in the examiner's hand or in the crook of the examiner's arm. Evaluating the murmur character while the heart rate changes can be very helpful in the feline patient. Murmurs that disappear as the heart rate slows are more likely to be innocent.

Heart murmurs are common findings in normal cats. Depending on the study, roughly $\frac{1}{4}$ of normal cats have auscultable cardiac murmurs and echocardiographic studies have demonstrated that, in cats with cardiac murmurs, approximately 50% of the murmurs are benign findings (i.e. there is no underlying heart disease) and of cats with cardiomyopathy, approximately 50% have murmurs and 50% do not. These statistics make one question whether performing echocardiography in all cats with murmurs is cost effective. Echocardiography is the best diagnostic modality to define underlying cardiac disease

and identify the cause of the murmur because in the early stages of disease, hypertrophic cardiomyopathy may be present without radiographic evidence of heart enlargement. However, over time the left (most commonly) atrium enlarges due to elevated ventricular filling pressures associated with cardiomyopathy and usually left atrial enlargement is present prior to the development of congestive heart failure. Therefore, thoracic radiographs are a reasonable screening tool when a murmur is detected on physical examination.

For the owner that wants a definitive answer as to the etiology of a cardiac murmur in a cat, an echocardiogram is recommended. Otherwise, it is reasonable to educate the owner that, although early cardiomyopathy may be present and not recognized with thoracic films, serial thoracic films demonstrating a persistently normal heart size suggest that, if cardiomyopathy is present, it is remaining clinically compensated. There is no evidence that beginning cats on cardiac medications prior to the onset of congestive heart failure is beneficial. Therefore, cardiac medications would not be recommended for this cat even if early cardiomyopathy were detected. Findings that increase the risk that structural heart disease is present (and therefore the echocardiogram is more likely to yield critical information include):

1. History suggestive of primary heart disease (i.e. possible syncopal events)
2. The murmur is continuous or diastolic.
3. The murmur has a precordial thrill.
4. Heart enlargement is present on thoracic radiographs
5. There are additional physical examination findings consistent with heart disease (i.e. an auscultable gallop sound, arrhythmia)

Specific considerations in the canine patient

Caveats to remember:

- 1: Diastolic, continuous and murmurs with a precordial thrill in young animals demand further investigation.
2. Grade I/VI murmurs are rarely clinically significant unless in a breeding animal.

A **new** cardiac murmur is noted on physical examination.

Dog is less than 4 months old

Dog is an adult
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If the murmur is:
Continuous,
Diastolic, or
≥ Grade IV/VI, the puppy should be worked up

If the murmur intensity is \leq Grade IV/VI and it's systolic, it may be a benign murmur the puppy will outgrow and its reasonable to monitor.

If murmur disappears as puppy ages, the murmur was benign and no further diagnostics are required.

If murmur persists or is of a character that warrants diagnostics (red text above), thoracic radiographs \pm echocardiography result in definitive diagnosis and treatment plan.

A **new** cardiac murmur is noted on physical examination in an adult dog.

Dog is a small breed

Dog is a medium to large breed

#1 differential is degenerative valve disease

Differential diagnoses:
1. Dilated cardiomyopathy
2. Degenerative valve disease

Diagnostics:
Thoracic radiographs to stage disease
Measure blood pressure
+/- echocardiography

Diagnostics:
Echocardiography
+/- thoracic radiographs
Measure blood pressure

Diagnosis is degenerative valve disease

Diagnosis is dilated cardiomyopathy.
Therapy vs. no therapy
Beta blockers
Pimobendan

Stage B1
No cardiac medications
Re-evaluate heart size yearly
Educate owner about heart disease

Stage B2
No cardiac medications
Re-evaluate heart size every 6 months
Resting respiratory rate log