



## **Heart Murmurs in the Asymptomatic Canine and Feline Patient**

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### **Introduction**

A heart murmur is a relatively common physical exam abnormality in dogs and cats. These murmurs are often discovered during the wellness exam, and the diagnostic path starts with the referring veterinarian. The patient signalment and age of murmur onset are important considerations when prioritizing differentials. The characteristics of the murmur, including the point of maximal intensity, timing and grade, can also help narrow the list of possible causes.

### **Review of Auscultation Technique**

Successful auscultation takes practice and a systematic approach. The clinician should ensure that their stethoscope is well-maintained and devote time to this part of the physical examination. Murmurs will be missed or be difficult to characterize in a setting with ambient noise. Patient movement and behaviors such as panting and vocalizing will also limit the exam. A thorough auscultation includes the following components:

Dogs:

- 1) Palpate both sides of the thorax to identify the apex beat and to identify any thrill associated with a murmur.
- 2) Auscult the left side of the thorax at the apex beat. This is generally where the heart sounds are loudest and is near the mitral valve.
- 3) Auscult the left heart base region by inching the stethoscope craniodorsally. Murmurs emanating from the great vessels, aortic and pulmonic valves are best heard at this location.
- 4) Auscult the right side at the level of the apex.
- 5) Palpate the femoral pulses while ausculting and assess the heart rhythm.

Cats:

- 1) Palpate both sides of the thorax to identify the apex beat and to identify any thrill associated with a murmur.
- 2) Auscult the left side of the thorax to the left of the sternum, close to the palpable apex beat. Auscult the left heart base region by inching the stethoscope craniodorsally. Some congenital defects result in a basilar murmur.
- 3) Auscult just to the right side of the sternum where the apex beat is palpable.
- 4) Palpate the femoral pulses while ausculting and assess the heart rhythm.

If a murmur is found, the timing should be recorded as systolic, diastolic or continuous. Most murmurs in dogs and cats are systolic. In dogs, the point of maximal intensity can be identified as left apical, left basilar or right sided. In cats, the point of maximal intensity is generally identified as left parasternal, right parasternal, or basilar. Any abnormal transient heart sounds, such as systolic clicks and gallops, can be clinically important, as well as abnormal rhythms or pulses deficits. Anecdotally, in cats, a gallop sound is more likely to be a reliable sign of structural heart disease than a murmur is.

Grading the intensity of a heart murmur is standard practice; however, it is important to realize that the intensity or grade of murmur is not necessarily correlated with the severity of disease. For example, a grade 5/6 murmur can be caused by mild mitral regurgitation, while a grade 2/6 murmur can be caused by severe tricuspid regurgitation. Table 1 describes a grading scale for murmur intensity.

**Table 1.** Example of scale for grading murmur intensity

<b>Murmur Grade</b>	<b>Description</b>
Grade 1	Faintest murmur that can be detected, heard only with special effort
Grade 2	A faint murmur clearly heard after a few seconds of auscultation by an experienced examiner
Grade 3	Moderately loud and easily heard murmur that is localized
Grade 4	Loud murmur with radiation with no thrill
Grade 5	Very loud murmur with palpable thrill
Grade 6	Very loud murmur with thrill; is audible when the stethoscope is slightly removed from chest wall

### **Murmurs in Puppies**

Physiologic murmurs are common in young puppies. These murmurs are systolic, grade 3 or quieter, with a point of maximal intensity at the left heart base. These are generally

gone by about 6 months of age. Echocardiography can be used to differentiate physiologic juvenile murmur from congenital heart disease. If this is not an option, the murmur can be monitored by auscultation at puppy wellness visits, and echocardiography is more strongly indicated if the murmur is still present at 6 months of age. A murmur that is continuous, loud, or has a PMI on the right side is not a physiologic juvenile ejection murmur and should be further evaluated. Thoracic radiography and cardiac biomarkers are not as useful in this situation as they are in the evaluation of acquired heart disease. Thus, a normal thoracic radiograph and/or normal NT-proBNP does not rule out congenital heart disease. Additionally, an enlarged cardiac silhouette or elevated NT-proBNP indicates that there likely is cardiac disease, but this patient would still require echocardiography to diagnosis the defect and determine the medical and surgical options, as well as assess prognosis.

### **Adult Dogs**

Some healthy dogs have ejection murmurs. These are systolic, grade 3 or quieter, with a point of maximal intensity at the left heart base, and are most common in large to giant breed dogs and boxers. Echocardiography is indicated to rule out structural heart disease.

Chronic valvular disease and cardiomyopathy are the most common acquired heart diseases in adult dogs. Echocardiography is the best way to make the diagnosis and stage the disease. If echocardiography is not available, thoracic radiography and biomarker testing can be used. In small breed, middle aged to older dogs with murmurs consistent with mitral regurgitation (systolic, left apical, grade 2-6/6); it is reasonable to assume chronic valvular disease based on the genetic predilection. If thoracic radiographs reveal and normal cardiac silhouette and the patient is asymptomatic, it is reasonable to initiate no medical therapy but plan a recheck radiograph in 6 to 12 months. NT-proBNP testing can also help decision-making in this setting. A very high NT-proBNP, combined with radiographic cardiomegaly, indicates risk of congestive heart failure and may benefit from referral or pimobendan therapy. A normal NT-proBNP indicates mild disease and no medical therapy should be initiated.

In predisposed breeds such as Dobermans, Boxers, Great Danes, and Irish Wolfhounds, a murmur may indicate occult cardiomyopathy. Echocardiography and possibly Holter monitoring are indicated to confirm the diagnosis and stage disease. If this is not available thoracic radiographs, NT-proBNP testing and ECG can be considered. If those tests are normal, the murmur is either physiologic or there is very mild heart diseases present. Enlarged cardiac silhouette, elevated NT-proBNP, and/or ventricular premature complexes would suggest cardiomyopathy or other cardiac disease and referral to a cardiologist should be more strongly recommended.

### **Murmurs in Kittens**

A moderate to loud heart murmur in a kitten is most likely due to congenital heart

disease. Ventricular septal defects, patent ductus arteriosus, atrial septal defects, and valvular dysplasia are all possibilities. Thoracic radiographs do not provide a diagnosis, but enlargement of the cardiac silhouette or vascular patterns can increase the suspicion of congenital cardiac disease and provide further incentive for a cardiologist referral. A normal radiographic cardiac silhouette does not rule out congenital heart disease.

### **Murmurs in Adult Cats**

Murmurs that arise in an adult cat are less likely to be due to congenital disease. Cardiomyopathy is the most common heart disease diagnosed in cats, and, unfortunately, a heart murmur is not a reliable indicator of this disease. Additionally, dynamic right ventricular outflow tract obstructions occur commonly in adult cats with sympathetic nervous system activation from non-cardiac diseases or the stress of a hospital visit. A dynamic right ventricular outflow tract obstruction is not considered progressive and no intervention is indicated. Laboratory testing for systemic conditions such as anemia and hyperthyroidism should be considered in adult cats with murmurs. Echocardiography is indicated to distinguish cardiomyopathy from a benign dynamic right ventricular outflow tract obstruction.

If this test is not available, further diagnostics with the general practitioner should be considered. Repeat auscultation can be helpful; in the author's experience, heart murmurs that are intermittent and disappear when the heart rate slows are more likely to be caused by a dynamic right ventricular outflow tract obstruction and less likely to be due to structural heart disease. Thoracic radiographs can reveal severe cardiomyopathy, which will cause obvious atrial enlargement. Unfortunately, a normal radiographic cardiac silhouette does not rule out cardiomyopathy in this population.

Circulating NT-proBNP measurement can be considered in adult cats with murmurs. NT-proBNP is a very sensitive test in cats, so if the result is normal, the patient is very unlikely to have structural cardiac disease. Cats with an elevated NT-proBNP should be tested for systemic hypertension and hyperthyroidism, and an evaluation by a cardiologist is recommended.

## References

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