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CIRCULATIONS
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Dr. Sonya Gordon,
DVM, DVSc, Diplomate ACVIM

Associate Professor of Cardiology, Texas A&M University

Tips for Diagnosing Heart Failure; Using Resting Home Respiration Rate

In the office, you are a jury of one. You evaluate all the evidence provided by the history, physical examination and selected diagnostic tests, such as radiographs and blood work, to judge whether or not the dog presenting in your office with cough, dyspnea, tachypnea or lethargy has heart failure.

The relative ease with which a verdict or diagnosis is reached depends on both the strength of the evidence and the experience of the juror. Ideally, available evidence should allow you to establish a verdict beyond a reasonable doubt, which is another way of saying that your diagnosis represents the true or at least the most probable cause of the dog's problems.

As a cardiologist, when it comes to diagnosing heart failure, I am very comfortable passing a verdict or making that judgment call, because that is what I do every day. But as a generalist, you might require additional evidence before you can say beyond a reasonable doubt that a dog has heart failure.

You might even evaluate the response to cardiac therapy in a dog with probable heart failure to confirm the diagnosis. Thus, a therapeutic trial can be used as a diagnostic "test" representing the final piece of evidence needed to establish the diagnosis.

THE WORKUP

It is usually a dog with signs of respiratory embarrassment – cough and/or labored, rapid breathing – that presents to your office requiring a cardiac workup. Coughs due to heart failure are typically soft, progressive and exacerbated by recumbency.

Although cough is probably the number-one complaint that results in owners bringing the dog with heart failure into the veterinary office, not all dogs with heart failure cough and not all coughs are associated with heart failure.

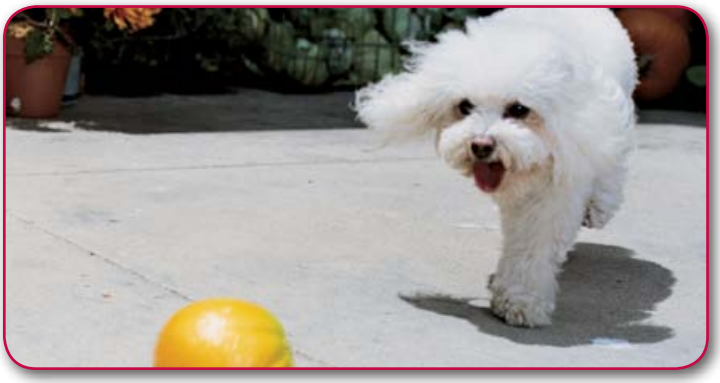
In addition, some dogs have an atypical cough that owners do not recognize. Instead, they may report that the dog is gagging, trying to clear its throat or choking on something. All of these – cough, breathing difficulty and sometimes gagging or clearing the throat – can be complaints associated with heart failure.

If you hear a murmur typical of chronic valvular disease in a small older dog, you should provide the owner with information about the disease, its tendency to progress over time and gently warn the owners that their dog is at risk for developing heart failure at some time in the future.

Describe the signs they should look for to help assure the dog will return for emergency re-evaluation as quickly as possible should these signs develop before its next scheduled re-evaluation. Educate clients and involve them in the management of their dog's heart disease, and teach them how to count a resting respiration rate. This allows for prompt diagnosis of heart failure and the initiation of life-prolonging treatment.

Heart disease progresses over months, even years, and a heart murmur is often the first sign that a dog has chronic valvular disease and may eventually develop heart failure. Heart murmurs are graded by degrees of loudness, and soft murmurs can be hard to hear, especially in brachycephalic dogs, dogs that are breathing loudly or severely obese dogs. But in general, in older, small-breed dogs, clinically significant murmurs tend to be reasonably loud and thus reasonably easy to hear. However, a large dog with dilated cardiomyopathy might not have a murmur or the murmur may be very soft and hard to hear.

In either a small or large dog, if you are having trouble hearing the murmur, placing your hand over the dog's nostrils for a few



seconds may be beneficial. This is the equivalent of asking a human patient to hold his or her breath. When the breath sounds are removed, it will be easier to hear the presence of a murmur.

If the dog has a murmur and the history and physical exam increase the index of suspicion that a patient may be in heart failure, the first test should be thoracic radiographs to look for an enlarged heart, enlarged vessels and a diffuse interstitial pattern in the caudal dorsal lung fields that is indicative of heart failure.

The two most common causes of canine heart failure – chronic valvular disease and dilated cardiomyopathy – both cause heart enlargement. Thus if the heart is not enlarged on the radiograph (vertebral heart score < 10.5), heart failure is very unlikely.

Some veterinarians put a lot of stock in lung sounds, but I don't think listening to crackling and wheezes adds a lot to the diagnostic evidence. Just as with cough, abnormal lung sounds may or may not be present in dogs with heart failure.

Serum chemistries and perhaps a urine analysis to evaluate kidney and liver function should be part of the standard workup prior to initiating medication. It is important to know where that function is before prescribing these medications because many cardiac medications can adversely affect the kidney and liver.

You may also want to measure blood pressure and ideally obtain an echocardiogram to confirm the diagnosis. Referral to or consultation with a cardiologist may also be useful.

But as you wait for confirmation of the underlying diagnosis, if the dog has heart failure you will need to treat the dog with at least furosemide (Lasix). That becomes the final test. If the dog has heart failure, its clinical signs should improve, and you should see a reduction in the severity of pulmonary infiltrate if the dog is treated with diuretics.

Owners should be warned that treatment of heart failure doesn't necessarily mean that all of the initial presenting signs, such as cough and lethargy, will disappear. For the most part, you are dealing with a geriatric dog that may have multiple problems. So, there still might be some bronchitis or other lung disease concurrent with the heart failure that will need to be addressed.

A common co-morbidity that can cause an older dog to slow down and appear tired and lethargic to the owner is degenerative joint disease. Treating the dog's heart failure may increase its activity level, but it might not start exercising if it is suffering pain from degenerative joint disease. I tell the owner that we are going to treat the big problem first – the heart failure – and then work on some of the other issues to improve/optimize the dog's quality of life.

COST CONSIDERATIONS

Most of us in veterinary medicine allow finances or preconceived notions of what people will pay for influence what we offer our clients. It is easy to get jaded when you are working in the front lines, and people don't always have the resources to pay for the gold standard. I always assume that people want the best for their pets. However, to be fair to owners, we should give them an idea of what the cost to manage heart failure will be.

This is an exercise I always give my students: determine what it costs to diagnose, treat and chronically manage heart failure. What is the monthly bill for a dog that weighs x kg? It is not cost-prohibitive. It usually works out to be about the same as a daily venti latte and scone from Starbucks, which is a lot easier to accept than "it is going to cost $600-$1,000 a year."

When you communicate that to owners, who often consider their pets family members, many will say, "**I love my dog a latte!**"

Of course, a dog that is unstable and in acute congestive heart failure needs immediate treatment and probably hospitalization, but the onset of heart failure for most dogs is gradual. Therefore, you and the owner will have time to evaluate the evidence and prescribe the best course.

RESTING RESPIRATION RATE

"New research has found that one of the most easily monitored signs associated with the development of heart failure is an increase in resting respiration rate, typically determined at home by the owner."

In a recent presentation at the ACVIM 2009 Forum, home surveillance of resting respiration rate was compared with sophisticated means of diagnosis, including radiographs and echocardiography. A resting respiration rate higher than 35/min at home in a dog was highly suggestive of heart failure.

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Thirty-five breaths/min is a good general cut-off point for most dogs, but accuracy may even be improved by determining a baseline and subsequent increase in individual dogs.

We typically teach owners how to count respiration rate during an office visit and ask them to do it when the dog is resting quietly or sleeping, recording it every day for a week. This will give a good estimate of that dog's normal respiration rate. Then, in asymptomatic dogs with a risk of developing heart failure we recommend the owners periodically (weekly) monitor the dog's respiration rate at rest at home. When the resting respiration rate is reproducibly greater than 35 or increased by approximately 25 percent-50 percent from baseline, owners should schedule a re-evaluation. So, if my poodle, which has chronic valve disease, has a respiratory rate in the mid-teens, and it increases to 25, that may be a clue that something is changing.

It is not 100 percent specific, but may be more sensitive than cough. And in many cases an increase in resting respiratory rate will occur before the dog coughs, if it coughs at all.

However, this means that you must educate clients and involve them in the management of their dog's heart disease. One of the things that many cardiologists do differently from generalists is that we actively engage the owner in their dog's heart disease management plan. We have wonderful medications today that have turned heart failure into a manageable disease in which most dogs can live a relatively long and very good quality life.

By telling owners with at-risk dogs how to recognize the signs of heart failure and how to count resting respiration rates, you can facilitate prompt diagnosis and increase the chances of that dog's survival. I always tell owners to look for cough, but I also tell them about surveillance of resting respiration rate.

Practical Tips on How to Incorporate Resting Home Respiration Rate

- New research has shown that one of the most easily monitored signs associated with the development of Stage C heart disease (i.e., pulmonary edema) is an increase in resting respiration rate (RR) determined at home by the owner.
- In a dog, an RR higher than 35/min at home is highly suggestive of pulmonary edema.
- 35 breaths/min is a good general cut-off point for most dogs, but accuracy may be improved by determining a baseline and subsequent increase in individual dogs.
- Owners should be taught how to count RR during an office visit.
  - They are instructed to observe the rate of breathing over 60 sec onds when the dog is resting quietly, preferable when sleeping.
  - They are told that one breath is counted every time the chest rises and falls: that is, up and down equal one.
  - When first starting they are instructed to do this daily for about a week to establish a baseline range typical of their dog's normal RR.
  - In Stage B2 dogs they are asked to then record the RR once per week on a calendar.
  - In Stage C and D dogs they are asked to record the RR daily on a calendar.
  - When the resting RR is reproducibly greater than 35 or increased by approximately 25 percent-50 percent from baseline, they should schedule a re-evaluation or contact the office. These appointments are often not emergent but they should let the office know why they are making the appointment so that they are promptly scheduled (i.e., within 24-36 hours).
    - Owners are instructed to make sure noted increases in RR are consistent over several readings. That is, the first thing they should do when they record a high RR is repeat it in 10-60 minutes. Real elevations in RR will be consistent and spurious results will not be overinterpreted.
- Owners are instructed to bring the record of the RR (i.e., the calendar) to their veterinary appointments.

Example: A poodle, which has Stage 2 chronic valve disease, has a respiratory rate in the mid-teens, and it increases to about 30. This represents a clue that pulmonary edema may be developing and prompts the owner to schedule an appointment for re-evaluation the following day.

- Determination of RR by owners is not 100 percent specific, but is more sensitive than cough. And in many cases an increase in RR will occur before the dog coughs, if it coughs at all.
- By telling owners with at-risk dogs how to recognize the signs of pulmonary edema and how to record RR, you can facilitate prompt diagnosis and thus increase the chances of that dog's survival. ■

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