Heart failure in dogs, recognition and assessment

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Overview of Heart Disease in Dogs

The overall incidence of heart disease in dogs is approximately 10%. The majority of these are due to adult heart disease although 1 in 10 dogs present with congenital heart disease.

There are many manifestations of heart disease the most common of which is congestive heart failure. But other presentations for example are a disturbance in the electrical rhythm (arrhythmias), heart base tumours and pericardial effusions, chronic respiratory disease leading to right sided heart failure (cor pulmonale).

Heart disease can be classified into defects which a dog was born with (congenital) or disease which arises during adult life (adult heart disease). Some congenital heart diseases are known to be hereditary (ie. passed on in the genes from the parents) and quite likely the majority are in view of the significant breed predispositions for various defects. It is also quite possible that some adult heart diseases are hereditary such as dilated cardiomyopathy.

Congestive heart failure (CHF)

CHF is a common consequence of many heart diseases. The symptoms of CHF are similar, although the cause of the heart disease can vary. To explain CHF, it is probably best to do so in two parts, 1. left sided CHF and 2. right sided CHF. Since most adult heart diseases ultimately lead to CHF, these diseases will also be discussed here.

1. Left sided congestive heart failure

When a disease, or a defect, of the left side of the heart leads to CHF, we term this left sided CHF. The symptoms that manifest are different to right sided CHF, hence the reason we distinguish left from right sided heart failure. The first disease described below, ie. mitral valve disease, explains how left sided CHF develops and the symptoms it causes.

a. Mitral Valve Disease

Mitral valve disease (aka valvular endocardiosis) is the most common cause of left sided CHF in adult dogs and the following explanation should provide an understanding of how mitral valve disease (MVD) leads to left sided congestive heart failure. It is more common in older dogs and in smaller breeds. Some breeds are predisposed, eg. the Cavalier King Charles Spaniel.
Each of the four valves in the heart should act as non-return valves, permitting blood flow in one direction (forwards) only and thus maintaining a normal flowing circulation. When MVD occurs in ageing dogs, the valves become degenerate and nodular, such that when the valve closes to prevent backflow, gaps occur in the valve resulting in a backward squirt of blood, with each heart beat. This backward squirt of flow through an incompetent valve results in an abnormal heart sound called a heart murmur. This sound occurs when the heart is contracting. A murmur thus sounds like a ‘squirting’ or ‘gushing’ sound during each heart beat.

In MVD, this results in an extra volume of blood returning to the left atrium. The left atrium therefore becomes stretched and dilated by the extra volume. This also causes a slight increase in pressure in the left atrium. Thus MVD leads to a damming up of blood behind the mitral valve, similar to how a dam in a river causes the water levels to increase behind the dam. This damming back of blood occurs not only into the left atrium but also dams back up the blood vessels returning blood to the left atrium from the lungs (ie. the pulmonary veins). This can then lead to the lungs becoming flooded, termed lung congestion (or pulmonary congestion). Hence the term congestive heart failure (CHF) is derived. Since the heart disease (the MVD) is on the left side of the heart, we call this left sided CHF.

The symptoms of left sided CHF can then thus be explained. There are three common (or major) symptoms of left sided CHF:

i. Breathlessness due to pulmonary congestion, as the lungs struggle to exchange gases (ie. oxygen and CO$_2$) the rate of breathing increases to compensate. The rested breathing rate (number of breathes per minute after rest and not panting) will increase markedly. The normal rate is <20 breaths/min. Dogs with pulmonary congestion can have rates in excess of 40/min.

ii. Exercise intolerance (fatigue on exercise) results due to the heart’s reduced pumping ability and reduced circulation. The muscles of exercise do not receive an adequate supply of well oxygenated blood at a good rate.

iii. Coughing commonly occurs due to compression of the windpipe (trachea) by the enlarged left atrium pushing up on it; or by a grossly enlarged heart squeezing the windpipe.

The survival, with current treatment, for dogs with MVD is quite variable, depending upon the severity of the valve degeneration, but is approximately 2 to 4 years on average from onset of CHF. Often the murmur can be detected 2 to 4 years before CHF develops - when treatment is required. In rare cases, rupture of a valve attachment can occur, leading to very acute onset of CHF, sometimes without prior symptoms or warning. The survival in these cases is often poor.

b. Dilated Cardiomyopathy

Dilated cardiomyopathy (DCM) is probably the second most common heart disease in adult dogs. It tends to occur in large breed dogs, three quarters are male and there are some breed predispositions such as: Dobermanns, Boxer,
Great Danes, Cocker Spaniels, Germans Shepherds Dogs, Labradors, Irish Wolfhounds, Golden Retrievers and Newfoundlands.

This is a disease in which the muscle of the left ventricle itself becomes weak. ‘Cardio-myo-pathy’ literally means ‘heart-muscle-disease’. Since the left ventricle is the major pumping muscle (or chamber) of the heart, the ability of the heart to pump and circulate blood is markedly reduced. Thus this results in a damming back of blood from the left ventricle. Since the left ventricle cannot empty fully it becomes stretched and dilated. This results in damming back of blood into the left atrium and pulmonary veins. Thus, like MVD, leads to left sided congestive heart failure. Thus the same symptoms of left sided CHF described for MVD above.

The survival statistics for dogs with DCM are generally considered poor. The survival, with current treatment, at 3 months is 50%, at 1 year is around 20% and at 2 years is 5 to 10%. Some breeds have a much poorer survival such as Dobermanns, and females have a slightly poorer survival than males.

2. Right sided congestive heart failure
When a disease, or a defect, of the right side of the heart leads to CHF, we term this right sided CHF. The symptoms that manifest are different to left sided CHF (described above).

a. Tricuspid Valve Disease
Tricuspid valve disease rarely occurs alone, it is virtually always in association with mitral valve disease (described above). Approximately one third of dogs with MVD also have tricuspid valve disease. Thus these dogs will have symptoms of both left and right sided CHF.

When tricuspid valve disease occurs in ageing dogs, the valve becomes degenerate and nodular (like MVD), such that when the valve closes to prevent backflow, gaps occurs in the valve resulting in a backward squirt of blood, with each heart beat.

In tricuspid valve disease, this results in an extra volume of blood returning to the right atrium. The right atrium therefore becomes stretched and dilated by the extra volume. This also causes a slight increase in pressure in the right atrium. Thus tricuspid valve disease leads to a damming up of blood behind the tricuspid valve, similar to how a dam in a river causes the water levels to increase behind the dam. This damming back of blood occurs not only into the right atrium but also dams back up the blood vessels returning blood to the right atrium from the body (ie. the vena cava). This can then lead to the body becoming ‘flooded’, which often manifests as free fluid accumulating in the abdomen this is termed ascites (this fluid occurs due to seepage of plasma out of the liver as a consequence of the back pressure). Free fluid can also accumulate in the chest cavity - the space between the rib cage and lungs (i.e. outside the lungs) - this is termed pleural or thoracic fluid. Since the heart disease (the tricuspid valve disease) is on the right side of the heart, we call this right sided CHF.
The common (or major) signs of right sided CHF are:
Ascites - the accumulation of free fluid in the abdomen - this is the most common symptom.
Thoracic fluid - the accumulation of free fluid in the chest space (around and outside the lung within the rib cage - not to be confused with lung congestion) is uncommon in dogs.

The survival for dogs with both mitral and tricuspid valve disease is slightly poorer than those with MVD only.

b. Dilated cardiomyopathy
In DCM, in many cases, the muscle of the right ventricle is also often affected by this disease. Thus a reduced pumping ability of the right ventricle results in a damming back of blood from it. The right ventricle becomes stretched and dilated and thus results in damming back of blood into the right atrium and vena cava, like tricuspid valve disease. Thus producing the same symptoms of right sided congestive heart failure as disease for tricuspid valve disease above.

c. Pericardial Effusion
The pericardium is a thin membrane that surrounds the heart and thus forms a small space between it and the outside of the heart called the pericardial space. Pericardial effusion is a disease in which there is a bleed, resulting in the pericardial sac filling up with a bloody fluid. The pressure of this prevents the thinner right side of the heart from pumping normally resulting in right sided heart failure. This therefore is one of the few diseases to result in signs of right sided failure, without also left sided failure.

There are essentially two main causes of a pericardial bleed. One is a neoplastic growth of the heart (eg. haemangiosarcoma or chemodectoma) and the other is an inflammation of the pericardium (idiopathic pericarditis; aka benign pericardial haemorrhage). Generally, neoplasia is more common in older dogs and in certain breeds such as the German Shepherd Dog (haemangiosarcoma) and Boxer (chemodectoma). Idiopathic pericarditis tends to occur in young to middle aged dogs, is more common in males and in certain breeds such as the Golden retriever and St Bernard.

Treatment of Pericardial Effusion
The treatment of pericardial effusion is by drainage of the blood using a catheter inserted through the skin and into the pericardial sac. This is a procedure that requires experience and skill and is not without risk. Once the bloody effusion is mostly drained, then it takes the pressure off the heart, permitting it to pump normally and effectively. Dogs in which a neoplastic growth has been found, have a poor prognosis as many bleed again or develop pulmonary metastases. In dogs with pericarditis up to 40% can relapse within a year requiring repeat drainage, or even surgery to remove the inflamed pericardial tissue.

Some human comparisons
a. Heart attack
In the strict medical (human) sense - a heart attack refers to the consequences of coronary artery disease, in which the coronary arteries become narrowed or occluded leading to starving of the heart muscle itself of a blood supply. This causes chest pain called angina.

Interestingly, dogs (or cats) do not get coronary artery disease and thus do not suffer from angina or heart attacks. Whether this is due to the difference in diet or smoking between dogs and humans has not been researched. However in trying to communicate with the public, the term heart attack is sometimes used to describe any sudden heart-related event.

b. Stroke
A stroke, in the medical sense, refers to a clot travelling from the heart to the brain to results in blockage of the blood supply to part of, or one side of, the brain. Again this is not something that occurs in dogs. However clots do form in cats, but when they break free they do not travel to the brain but to the back legs (most commonly) resulting in paralysis. Again, the term stroke may occasionally be used to describe a defect in the balance apparatus of the inner ear (vestibular syndrome) that outwardly and superficially looks a little like the one-sided symptoms seen in humans with a stroke.
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Diagnosis of Heart Disease

In some instances a presumptive diagnosis can be made by the presenting symptoms, clinical examination and the predispositions for breed and age. For example, a Cavalier that developed a murmur at 6 years old, presenting 2 years later with breathlessness and cough, and now with a much louder murmur, is likely to have progressed into CHF. Or for example, a 6 year old male Dobermann that presents with fairly rapid onset breathing difficulties and coughing, in which an abnormal heart sound can be auscultated is likely to have CHF due to DCM. However, in many instances, if the diagnosis is not obvious or is uncertain, then additional tests need to be performed. However prior to selecting the most appropriate, useful and rewarding test, needs a carefully taken history and thoughtful clinical examination.

HISTORY AND PHYSICAL EXAMINATION

A dying art?

In our interest and enthusiasm for modern diagnostic tools, are we neglecting the art of taking a history and skill of a thorough physical examination? Cardiorespiratory diseases represent a large proportion of the internal medicine cases in small animal practice. The overall incidence of heart disease in small animals is approximately 10% with congenital diseases accounting for 1 in 10 of these.

Referral for specialist opinion should always be considered as an available option

PREDISPOSITIONS/PREDILECTIONS

Knowing what diseases are common in which breeds, age or sex of animal can be of great benefit in producing a list of differential diagnoses.

Age
- There is a wide range of conditions that show a definite age incidence
- Congenital diseases usually appear in young animals, but it should be remembered that is not uncommon for mildly affected animals to live a normal life.
- Dilated cardiomyopathy tends to occur in middle aged dogs, 3-7 years, but younger and older animals may be affected.

Sex
- diseases of the A-V valves, congenital dysplasia or endocardiosis and idiopathic dilated cardiomyopathy and pericardial effusion are more common in males.
- patent ductus arteriosus (2:1) and Addison's disease (hypoadrenocorticism) are seen more commonly in females.

Breed
Breed factors need to be considered, particularly in cardiac diseases where there are numerous examples of breed-related problems. This is not an exhaustive list, but aims offers the clinician some guidelines on what to consider when formulating a differential diagnostic list. The breed prevalence may vary between countries or even regions within countries.

There are additionally some broad generalisations that can be helpful.

- A-V valve endocardiosis - small to medium sized breeds
- Congenital developmental disorders of the nares, soft palate, pharynx, larynx and trachea - brachiocephalic breeds
- Nasal aspergilosis - dolicephalic breeds
- Laryngeal paralysis - large/giant breeds
- Tracheal collapse - toy breeds
- Chronic bronchitis and pulmonary interstitial fibrosis - terrier breeds

**HISTORY**
A thorough clinical history should be obtained in all cardiorespiratory cases with attention being given to all body systems. Once the predominant cardiorespiratory clinical sign is identified its duration, severity and progression needs to be determined. History of disease in the dam or sire can be useful especially for heart disease. Check if there has been a long standing murmur present suggestive of congenital heart disease or valvular endocardiosis. A recent onset murmur may suggest dilated cardiomyopathy, a new and changing one may be due to endocarditis. Any previous therapy should also be noted. The response to therapy can be useful in the diagnosis of several respiratory conditions, while in cardiac diseases it may give an initial guide to the expected future response to cardiac therapy. Check if there is a previous history of neoplasms that have been surgically removed, and the histopathological identity of such tumours should be obtained.

- Establish the primary reason why the owner has presented the animal
- In difficult or complex cases, this could take much longer than a routine consult time
- Ask non-leading questions
- Ask owners to describe what they actually saw (not their interpretation of what they think they saw)
- Do not diagnose conditions that do not explain the symptoms, eg the incidental heart murmur
- Do not find conditions that ‘appear’ to be present from blood work, rads, ECGs, etc. that do not fit logically with the symptoms
- Remember to check prior history, eg. long standing murmur, the forgotten mammary strip, the forgotten previous referral

**CLINICAL EXAMINATION**
Develop a routine to ensure nothing is overlooked. It is very tempting and easy when there is an obvious clinical finding to be less thorough. The physical examination should involve a thorough examination of all other body systems prior to concentrating on the cardiorespiratory system. Particular attention should be paid to the animal's general condition.
General Impressions/Observation

- Animals with congestive heart failure (particularly with dilated cardiomyopathy) may also appear debilitated and cachexic.
- Gross obesity severely compromises respiration and may be a precipitating cause of coughing in dogs with tracheal collapse. Obesity will also exacerbate coughing associated with pulmonary and cardiac disease.

Specific Examination of the Cardiorespiratory System

Chest auscultation is usually performed after the general physical examination.

Mucosal colour

The colour of the mucous membranes (gums rather than tongue) should be assessed and the capillary refill time evaluated:

- pale mucous membranes may be due to peripheral vasoconstriction (resulting from reduced cardiac output or shock) or anaemia
- congested ('flushed') mucous membranes may be due to venous congestion (right sided congestive heart failure)
- injected mucous membranes may suggest a toxaemia/septicaemia
- cyanotic mucous membranes may be due to decreased oxyhaemoglobin, eg. severe respiratory tract disease or a right to left shunting congenital cardiac defect
- a sluggish capillary refill time may indicate reduced cardiac output, ie. forward failure (it's value is questionable)

- The jugular veins be inspected and the neck will usually need to be clipped for adequate visualisation. Distension/pulsation is associated with right sided congestive heart failure (CHF) (eg. pericardial tamponade, tricuspid regurgitation) or dysrhythmias. Distended jugular veins in a dog with ascites will almost certainly mean the cause is cardiac in origin, as opposed to liver disease.
- The neck should also be examined for masses eg. hyperthyroidism in cats
- Peripheral oedema secondary to cardiac disease is rare in small animals, and probably more likely to be associated with hypoproteinaemia, mediastinal masses or vena cava syndrome.

Pulse

- Feel both femoral pulses for rate, rhythm and strength. In cats with aortic thromboembolism either or both may not be palpable. Animals with a PDA usually have a very hyperdynamic (short and sharp) pulse. This is often described as a 'waterhammer' pulse (although using this adjective is probably no longer useful as many people will not be familiar with a waterhammer!)
- The pulse usually reflects left ventricular stroke volume and contractility; a very weak pulse is found in dilated cardiomyopathy, but not necessarily so with mitral valve disease.
- The rate and rhythm should be noted; dogs in congestive heart failure (CHF) usually have a tachycardia whereas those with respiratory disease are more likely to have a more normal rate with sinus arrhythmia.
- When there is a dysrhythmia present (especially atrial fibrillation) the pulse rate is much less than the heart rate (pulse deficit) and has an irregular rhythm.
Palpate the thoracic wall to identify precordial thrills (grade 5/6 or 6/6 heart murmurs) and assess the strength of the apex beat (eg. increased in hypertrophic cardiomyopathy in cats or reduced with pericardial effusion).

Palpate the abdomen to assess liver size, the presence of masses or ascites.

The respiratory pattern and respiratory rate should be assessed and counted. While these parameters may be of little value in assisting diagnosis, they are very useful in the initial assessment of the severity of the disease.

The degree of tachypnoea or dyspnoea merely reflects the severity of disease and rarely the cause or location.

Expiratory dyspnoea tends to be an end-expiratory noise and is classically seen with tracheal collapse, intrathoracic masses and severe pulmonary oedema.

Dyspnoea is best appreciated in non-tachypnoeic animals, and is caused by dynamic collapse of large airways. (The abdominal wall recoil seen with tachypnoea and hyperpnoea should not be confused with expiratory dyspnoea.) When true dyspnoea is present it tends to prolong the associated phase of respiration, ie. inspiratory dyspnoea will cause an increased inspiratory phase duration and vice versa.

Orthopnoea, or breathing in sternal recumbency with the elbows abducted, is indicative of severe pulmonary changes or pleural effusion. These animals have minimal respiratory reserve and minor stress may be fatal.

Coughing in dogs may be due to cardiac or respiratory disease, whereas in cats it is usually due to respiratory disease (rarely cardiac disease).

CHEST AUSCULTATION

The location and intensity of cardiac and respiratory sounds are assessed. The system should be ausculated from the larynx to the chest periphery and both sides of the chest must be checked.

*Tip:* it is usually possible to stop cats purring, by touching their nose with cotton wool soaked in spirit/alcohol.

Respiratory Sounds

Crackles are usually inspiratory. Crackles are caused by the re-opening of airways that have collapsed during expiration and so are inspiratory. They are associated with severe lung consolidation or intrathoracic airway collapse.

Cardiac Auscultation

Normally only two heart sounds are audible in small animals ('lubb-dup' - S1 & S2). S1 is associated with the start of systole and closure of the A-V valves and is slightly louder over the apex of the heart. S2 is associated with the end of systole (start of diastole) and closure of the semilunar valves (aortic and pulmonic valves) and is slightly louder over the left heart base. When auscultating the heart it is important to 'inch' the chest-piece over the complete area of audible heart sounds.

Area and audibility

*Note the area over which the heart can be heard. Is it larger than normal - suggesting the presence of cardiomegaly?
Is the heart muffled - suggesting pericardial or pleural effusion?

Rate and rhythm

The most commonly heard rhythm in dogs is sinus arrhythmia. This is heard as a heart rate that increases and decreases in a fairly regular rhythm, often (but not always) with respiration. This can vary or be exaggerated (particularly in the presence of respiratory disease) making it difficult to be certain that it isn't a 'true' dysrhythmia.

Count the heart rate and compare it to the pulse rate. When a pulse cannot be palpated following an audible heart beat this is referred to as a pulse deficit. This may occur with premature beats or atrial fibrillation. Typically there is a 50% pulse deficit in dogs with atrial fibrillation; for example, there may a heart rate of 180/min (and a chaotic rhythm) with only a pulse rate of 100/min..

In many dogs in congestive heart failure, there is a compensatory tachycardia and noting the heart rate may assist in distinguishing between respiratory disease and heart disease (this does not appear to be the case with cats, who may even have a paradoxical bradycardia when in heart failure).

Premature beats can often be heard as an earlier than expected heart sound, sometimes referred to as a 'tripping in the rhythm'. However in some cases, the premature beat may have a reduced audibility and not be heard, thus it may sound like a 'dropped' or 'missed' beat and therefore mimic a sinus block/arrest.

Complete heart block usually has a slow heart rate which is constant and does not vary, as opposed to partial heart block or sinus bradycardia, which often have some variation in the rhythm. Occasionally in a dog with complete heart block, atrial contraction sounds (S4) may be heard (using the bell) as a faster 'distant' sound; this sound is virtually pathognomonic.

Other heart sounds

Murmurs are created due to vibration of structures within the heart set in motion by abnormal high velocity blood flow and turbulence. Murmurs can be classified into a number of categories to aid in the identification of their origin. Although the exact source of a murmur is not often determined, a short list of possible differentials can usually be obtained.

Gallop sounds/rhythms are so called after the sound created by a 'galloping' horse. A gallop sound is created by the addition of a third heart sound (S3 or S4) and is usually an indicator of heart disease in small animals.

A split S2 is most commonly as a result of delayed closure of the pulmonic valve, and may occur with pulmonic stenosis, a ventricular septal defect or pulmonary hypertension.

A systolic click, is a single clicking noise which occurs at some point (which may vary) during systole. Its cause is unknown but may be due to mitral valve disease.

Timing

Systolic murmurs are the most common and occur during ventricular contraction. These can be further classified as holosystolic when the heart sounds can still be heard and pansystolic when the murmur obscures the heart sounds. Holosystolic murmurs are associated with abnormal flow.
through the semilunar valves and pansystolic murmurs with A-V incompetence and a ventricular septal defect.

- **Diastolic murmurs** are rare in small animals. The most common cause is aortic regurgitation secondary to bacterial endocarditis. Although this is usually a very difficult murmur to hear, it has a distinctive sound because of its timing (after the second heart sound) and it is decrescendo.

- A **continuous murmur** is one which is constantly present. This is most commonly due to patent ductus arteriosus (PDA). It is continuous because of the constantly present pressure difference between the aorta and pulmonary artery creating abnormally fast flow through the PDA. However, the murmur is loudest during systole (when the pressure difference is greatest) and becomes quieter in diastole - i.e. it waxes and wanes during the cardiac cycle. This is commonly referred to as a 'machinery' murmur (however this adjective probably carries little descriptive value for most people nowadays!). A continuous murmur can be mimicked by the combination of a systolic murmur and a diastolic murmur, e.g. subaortic stenosis with aortic regurgitation or a ventricular septal defect with secondary aortic regurgitation.

**Character**

- The character of a murmur refers to the quality of the sound. Harsh murmurs are associated with stenosis of the semilunar valves. Soft (or blowing) murmurs are associated with valvular regurgitation. Phonocardiography is able to classify these further as crescendo-decrescendo (stenosis murmurs) or of a constant intensity (regurgitant murmurs) but this is very difficult to appreciate on auscultation.

**Point of maximum intensity (PMI)**

- By finding the point at which a murmur is loudest (despite the fact that it may radiate widely) it is assumed that this is near the source of the murmur. For this purpose the heart on the left side can be divided into the 'base' (where the aortic and pulmonic valves are located) or the apex where the left ventricle is located and the apex beat (cardiac impulse) can be palpated.

  - At the left apex the soft blowing systolic murmur of mitral valve regurgitation can usually be found.

  - At the left base the harsh systolic murmurs of aortic and pulmonic stenosis can be heard. In addition the systolic component of a PDA may be heard, but the 'complete' continuous murmur is usually heard a little further dorsally and/or cranially in the chest.

  - On the right side at the 4th or 5th intercostal space in the region of the 'mid-heart', the soft systolic murmur of tricuspid regurgitation can be heard (note: it is also usually associated with a systolic jugular pulse). At the most cranial aspect of the heart and near the sternum on the right, a ventricular septal defect is usually heard most loudly. Aortic stenosis is often heard on the right, more dorsally.

**Intensity**

- Murmurs can be classified according to their loudness (intensity). However this, unfortunately, does not necessarily reflect the severity of a lesion.

- 'Flow' or physiological murmurs tend to be fairly quiet (< grade 2 or 3) and may vary in intensity. These may occur with anaemia, a fever or be a normal in puppies.
Table. Classification of murmurs based on intensity.

<table>
<thead>
<tr>
<th>Simple grading</th>
<th>Grade (out of 6)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUIET</td>
<td>1/6</td>
<td>Quiet murmur, difficult to hear</td>
</tr>
<tr>
<td>QUIET</td>
<td>2/6</td>
<td>Quiet murmur, usually heard immediately.</td>
</tr>
<tr>
<td>MODERATE</td>
<td>3/6</td>
<td>Loud murmur, is easy to hear</td>
</tr>
<tr>
<td>MODERATE</td>
<td>4/6</td>
<td>Very loud murmur, but NO palpable precordial thrill.</td>
</tr>
<tr>
<td>LOUD</td>
<td>5/6</td>
<td>Palpable precordial thrill, very loud murmur</td>
</tr>
<tr>
<td>LOUD</td>
<td>6/6</td>
<td>Palpable precordial thrill and murmur can be heard with the chest piece of the stethoscope lifted off the chest.</td>
</tr>
</tbody>
</table>

The essentials summarised!
1. Are the heart sounds louder or quieter than normal?
   • Does the apex beat feel stronger or weaker
2. Is there a pulse for each heart beat?
   • Count HR & PR
3. Is the rhythm:
   • Normal
   • Tripping
   • Chaotic
4. If there is a murmur:
   • Is the PMI left base, left apex or right?
   • Is it quiet, moderate or loud?
   • Is it continuous or not?
5. Is there a gallop sound?

Recommended Reading

Notes on Cardiorespiratory Diseases of the Dog and Cat,

CLINICAL RECOGNITION OF HEART FAILURE – summary

**Symptoms**

- Exercise intolerance
- Cough
- Dyspnoea

These are symptoms of both heart failure and respiratory disease

**When might symptoms be significant?**

**Breed**

- Is it a breed in which heart disease is common?
  - Small breeds with a LOUD murmur suggestis MVD
    - CKCS, terriers, Yorkies, x-breeds
  - Medium to large breeds (>15kg) are presdiposed to DCM
    - Cocker Spaniels and larger breeds.
    - Dobermann, Boxer, Gt Dane, GSD, Lab, IWH
    - Rarely x-breeds
    - But some larges breeds can develop MVD

Or

- Is it a breed in which respiratory disease is more likely?
  - A false +ve diagnosis of heart failure can be made in….
    - Small breed dogs WITHOUT a murmur
    - Brachycephalic breeds
      - Bulldog, Bichon, Peke, Pug, Shih tzu
      - WHWT, Cairns, Toy poodles, Yorkie, SBT

**Clinicals findings that suggest heart failure**

- Tachycardia (loss of sinus arrhythmia)
- Arrhythmias
- Increased apex beat
- Gallop sound
- Pallor
- Ascites
- Jugular distension

**Clinicals findings that suggest respiratory disease**

- Upper airway inspiratory obstructive dyspnoea
- Respiratory sinus arrhythmia
- Cyanosis
- Inspiratory crackles
- Expiratory wheeze
A decision on whether this is a cardiac or respiratory case should be reached at this point, and thus appropriate diagnostics planned.
Table: Differential diagnosis of cardiac versus respiratory disease

<table>
<thead>
<tr>
<th></th>
<th>Cardiac Disease</th>
<th>Respiratory Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>History</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breathless</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cough</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Exercise intolerance</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Duration of cough</td>
<td>Short/medium</td>
<td>Chronic</td>
</tr>
<tr>
<td>Collapse</td>
<td>Common</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Body condition</td>
<td>Normal/cachexia</td>
<td>Obese</td>
</tr>
<tr>
<td><strong>Clinical examination</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mucosal colour</td>
<td>Pallor</td>
<td>Cyanosis</td>
</tr>
<tr>
<td>Apex beat</td>
<td>Increased or decreased</td>
<td>Normal</td>
</tr>
<tr>
<td>Pulse strength</td>
<td>Normal / decreased</td>
<td>Normal</td>
</tr>
<tr>
<td>Heart rate</td>
<td>Tachycardia</td>
<td>Normal</td>
</tr>
<tr>
<td>Sinus arrhythmia</td>
<td>Reduced / absent</td>
<td>Normal / pronounced</td>
</tr>
<tr>
<td>Ascites</td>
<td>With right CHF</td>
<td>If cor pulmonale (uncommon)</td>
</tr>
<tr>
<td>Ectopics</td>
<td>Likely</td>
<td>Rare</td>
</tr>
<tr>
<td><strong>Auscultation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Murmur</td>
<td>Present with MVD, often with other heart diseases</td>
<td>Could be present incidentally</td>
</tr>
<tr>
<td>Gallop sound</td>
<td>Cardiomyopathies most commonly</td>
<td>No</td>
</tr>
<tr>
<td>Large/loud heart</td>
<td>With cardiomegaly</td>
<td>Normal</td>
</tr>
<tr>
<td>Muffled heart</td>
<td>With pericardial disease</td>
<td>Normal</td>
</tr>
<tr>
<td>Pulmonary crackles</td>
<td>Airway oedema - rare</td>
<td>Airway disease - common</td>
</tr>
</tbody>
</table>