

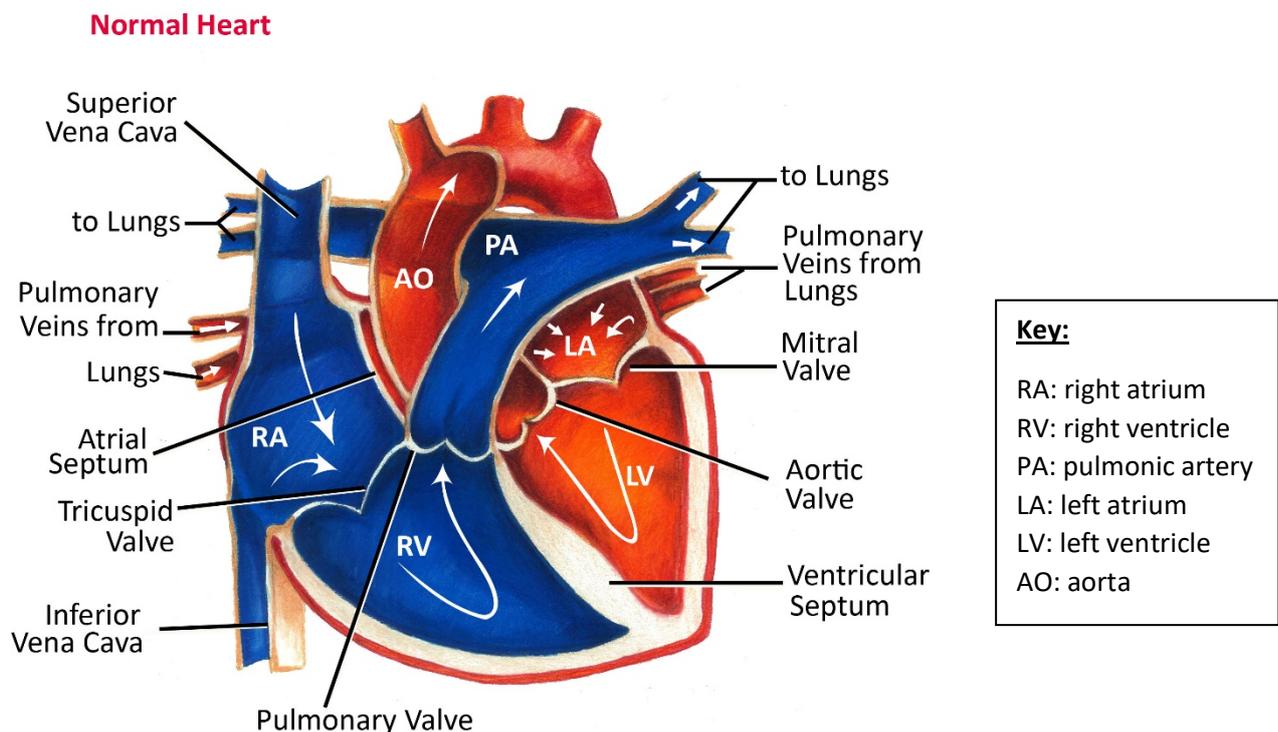


Degenerative Valve Disease

How does the heart work?

The heart is the organ responsible for pumping blood to and from all tissues of the body. The heart is divided into right and left sides. The job of the right side is to pump oxygen-deficient blood returning from the body into the lungs where fresh oxygen is collected and carbon dioxide is removed. The oxygen-rich blood returning from the lungs enters the left side of the heart where it is pumped into the aorta then to the rest of the body via the arterial system.

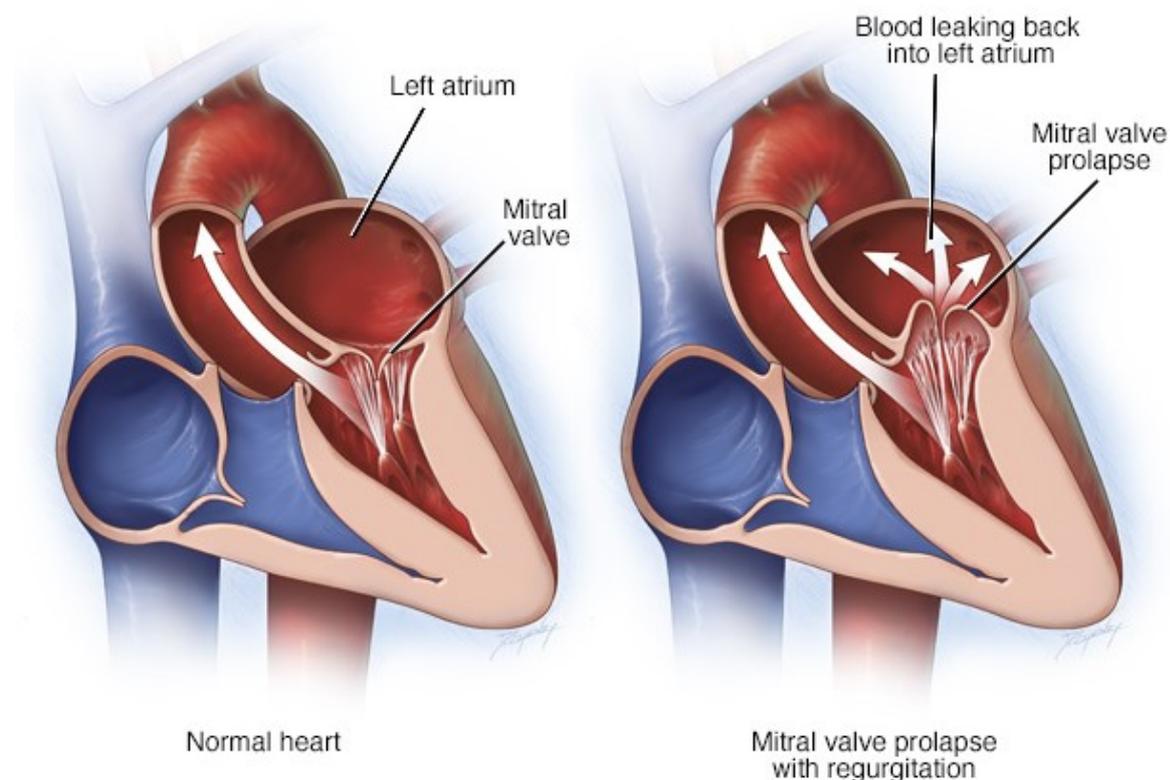
Each side of the heart has two chambers, an upper atrium and a lower ventricle. Between the atrium and ventricle on each side lies a valve – the tricuspid on the right and the mitral on the left – that regulates blood flow into the chambers. As the heart pumps, these valves act as one-way gates allowing blood to flow from the atrium above to the ventricle below and preventing blood from flowing back into the atrium. From the ventricles, blood is then forced to flow out into the pulmonary artery (on the right) or the aorta (on the left) through a second series of one-way valves called the pulmonic valve and the aortic valve, respectively.

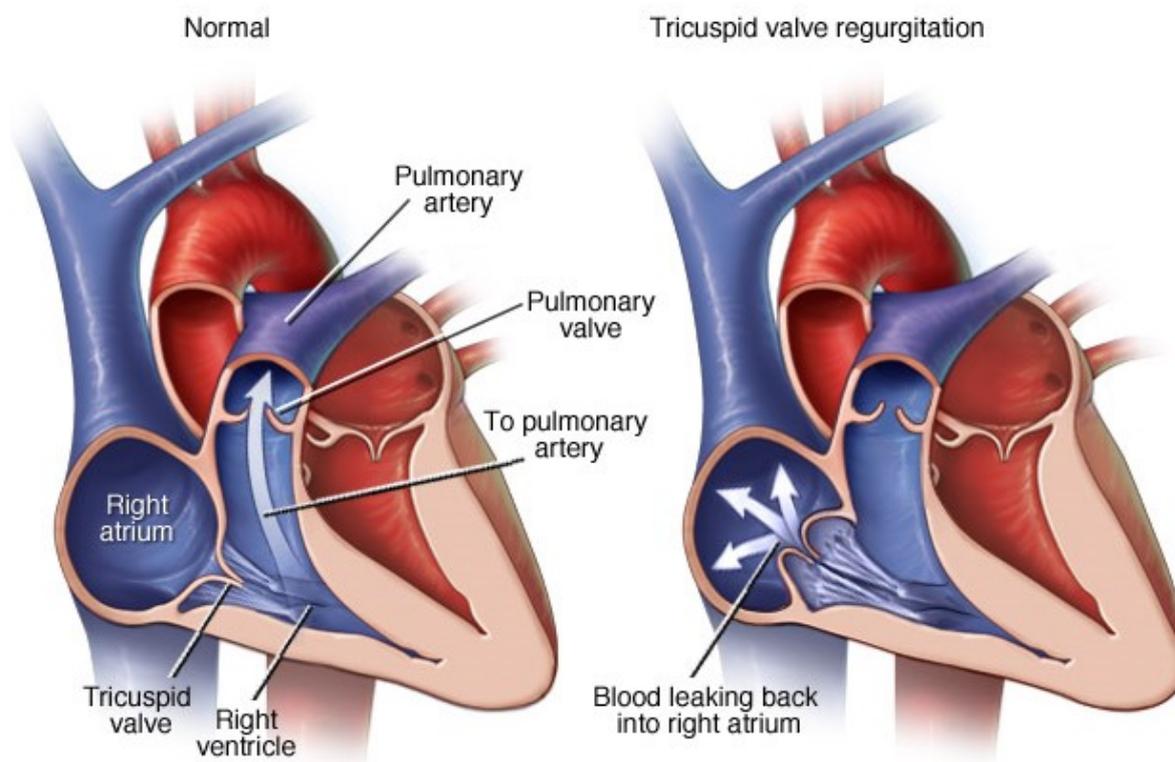




What is Degenerative Valve Disease?

Degenerative valve disease (DVD), also called myxomatous valve disease and endocardiosis, is non-infectious degeneration of the cardiac valves. In dogs, the most commonly affected valve is the mitral valve (on the left side of the heart), followed by the tricuspid valve on the right side. The pulmonic and aortic valves are rarely affected by this condition. For reasons we do not completely understand, the mitral or tricuspid valve leaflets can become abnormally thickened and develop a nodular appearance in some breeds. These, and other changes to the valves, impede their ability to form a tight seal between the atrium and ventricle during systole (contraction of the heart muscle), and subsequently begin to leak. As a result, some of the blood in the ventricle now flows back into the atrium through the leaky valve (known as regurgitation) instead of moving forward from the ventricle into the aorta (on the left side) or pulmonary artery (on the right side) with each beat. The consequences of this are discussed below.





What animals are affected by DVD?

Degenerative valve disease accounts for about 75% of cardiovascular disease in dogs. Approximately 60% of affected dogs have degeneration of the mitral valve, 30% have lesions on both the mitral and tricuspid valve leaflets, and 10% have only tricuspid valve disease. In dogs, the disease is age and breed-related, with older, small-breed dogs demonstrating a higher incidence. There is also a slight predisposition among male dogs.

Cavalier King Charles Spaniels, Miniature Poodles, Dachshunds, Cocker Spaniels and Miniature Schnauzers are the most commonly affected breeds. Cavalier King Charles Spaniels tend to develop DVD earlier in life with a faster progression than other small breed dogs. Terrier breeds are also commonly seen with DVD. Larger breeds are also affected by this disease (most commonly the mitral valve leaflets) although much less often.

Degenerative valve disease is uncommon in cats.



How does DVD affect your dog?

The outcome of DVD in dogs depends on the severity of the condition. The clinical signs depend on which valve is affected.

The regurgitation of blood due to DVD causes a murmur (abnormal heart sound) when your veterinarian listens to your dog's heart. Murmurs due to mitral and/or tricuspid regurgitation are much more common than clinical signs related to the disease. Many patients develop only mild and slowly progressive valvular lesions that have no effect on the patient's longevity or quality of life.

However, when mitral regurgitation is substantial, the flow of blood back into the left atrium results in a blood volume overload inside the left atrium (and left ventricle). This causes these chambers to enlarge as they attempt to accommodate the extra blood. If the regurgitation is severe, chamber enlargement reaches a limit and the pressure inside these chambers begins to increase. Once a critical pressure is reached, fluid within the lung vessels (which are connected to the left atrium) begins to leak out (pulmonary oedema), resulting in clinical signs of left-sided congestive heart failure (CHF).

Congestive heart failure due to DVD of the mitral valve usually presents as rapid and laboured breathing (contrary to popular belief, coughing is not a common clinical sign of congestive heart failure in dogs or cats). With more advanced disease, generalised decrease in forward circulation of blood to the body can result, which may manifest as lethargy, exercise intolerance, lack of appetite and/or weight loss.

Tricuspid valve DVD has a similar course of events as mitral valve DVD, but instead of fluid building up in the lungs (pulmonary oedema), fluid builds up in body cavities: abdomen and less commonly the pleural space (chest cavity). Dogs with right-sided congestive heart failure tend to develop a grossly distended abdomen. This can cause some discomfort, especially when lying down, and can cause shortness of breath, particularly when sleeping or resting.

How is DVD diagnosed?

Although there are many diagnostic modalities for heart disease, the only way to make a definitive diagnosis of DVD is using echocardiography (cardiac ultrasound). Ultrasound allows us to look inside the heart and hence visualise the abnormal valves. Thoracic radiographs (x-rays) may be suggestive of a DVD however cannot be used to make a definitive diagnosis (they are however very useful to confirm the presence of left-sided CHF).



How is DVD treated?

Treatment of DVD is predominantly aimed at eliminating signs of congestive heart failure. Drugs commonly used include diuretics (frusemide, spironolactone), angiotensin converting enzyme inhibitors (benazepril, enalapril) and the inodilator drug pimobendan. The diuretic forces the kidneys to excrete more sodium and water. This in turn eliminates pulmonary oedema (fluid in the lungs) and so improves your pet's breathing. With right-sided congestive heart failure (fluid in the abdomen or chest cavity), repeated physical removal by your veterinarian is often the best option (generally by using an appropriately sized needle or catheter under sedation).

Can I delay the onset of congestive heart failure in my pet?

A recent study has shown that administration of pimobendan to dogs with stage B2 degenerative valve disease (i.e. mitral regurgitation with enlargement of the left side of the heart but without current or previous congestive heart failure) can delay the onset of congestive heart failure (pulmonary oedema) by approximately 15 months. No other treatment has been proven to delay the onset of congestive heart failure in dogs.

Can diet help?

Some animal diet manufacturers have developed heart-specific diets that are moderately restricted in salt. However, while these diets are unlikely to be harmful, they have not been shown to affect progression of disease or control of clinical signs.

Is there surgery to correct DVD?

In human medicine, valve repair or replacement is a common surgical procedure. Unfortunately, surgical exposure of the mitral or tricuspid valves requires cardiopulmonary bypass. Although currently being performed by a few veterinary surgeons around the world, bypass surgery is difficult to perform in small animals. Costs for valve repair/replacement are prohibitive for most dog owners. There are limitations on the types of patients that are suitable for surgery. If you wish to investigate the possibility of surgical correction, discuss this with a veterinary cardiologist.

Heart transplants are not an option in dogs because it would require killing a healthy dog to obtain its heart – something that is considered unethical by the veterinary profession.



What should you monitor at home?

It is important that you monitor your pet's overall attitude and any change in behaviour. However, the most important monitoring tool a pet owner has at their disposal is the sleeping/resting respiratory rate. Please see the separate sleeping respiratory rate form for more details.

Other clinical signs to watch for include:

- laboured breathing
- fainting spells
- abdominal enlargement
- restlessness
- reduced appetite

If you notice any of the above clinical signs please contact your veterinarian immediately.

What is the prognosis for dogs with DVD?

The prognosis depends on the stage of disease. The prognosis for dogs prior to the onset of CHF is highly variable- dogs may remain in this stage for many years prior to the development of CHF (and in fact some dogs will never develop heart failure). However, once CHF has developed, the prognosis from this point onward is roughly 12 months. Although medical treatment is palliative only, quality of life for the most part is considered very good (particularly if owners are closely monitoring sleeping respiratory rates).

Additional Resource:

<http://vetmed.tufts.edu/heartsmart/>

This is a very useful and well-written resource, providing pet owners with a clear and credible source of information about veterinary cardiology.