



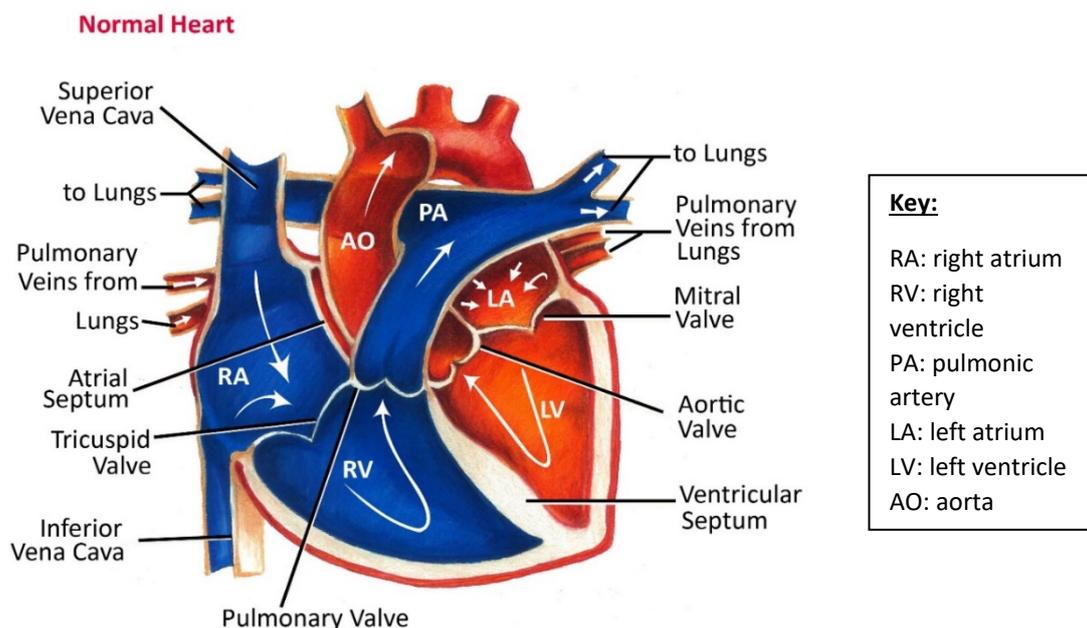
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Pericardial Effusion

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. The left ventricle is much thicker and stronger than the right ventricle because it must pump blood long distances around the whole body whereas the right ventricle only needs to pump blood a short distance to the lungs. Surrounding the heart is a sac called the pericardial sac (or pericardium). The pericardium is normally filled with a very small amount of fluid which is designed to lubricate the outside of the heart.





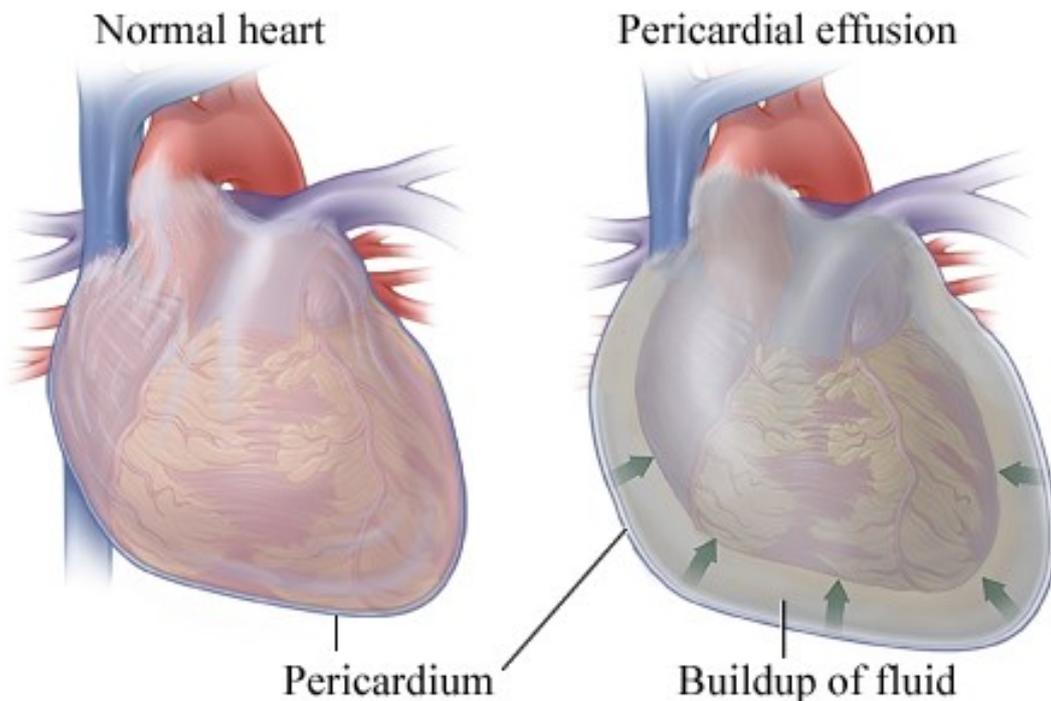
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What is pericardial effusion and its consequences?

Pericardial effusion refers to an abnormal accumulation of fluid in the pericardial sac. The consequences of pericardial effusion depend on the severity of fluid accumulation as well as the rate at which it accumulates. Dogs that develop pericardial effusion slowly, normally tolerate it quite well, whereas those that have a sudden accumulation of fluid often have severe, life-threatening clinical signs.

The build-up of fluid in the pericardial sac increases the external pressure on the heart. With severe effusion the pressure increases so much it begins to cause collapse of the right heart chambers (the right side is much more susceptible to collapse because it is thinner compared to the left). Collapse of the right heart chambers is called cardiac tamponade. Tamponade can have various consequences which depend on the rate of fluid accumulation. When pericardial effusion develops slowly, signs of right-sided congestive heart failure tend to predominate (meaning fluid builds up in the abdomen and/or around the lungs). These animals tend to remain quite bright and well in themselves.

In contrast, if pericardial effusion develops suddenly, animals can present with signs of cardiogenic shock. This means the heart finds it very difficult to pump blood around the body. Decreased blood flow to the vital organs can cause signs of severe weakness and even collapse.





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What causes pericardial effusion?

In dogs, pericardial effusion is most commonly associated with cardiac tumours. The most common type of tumour is called a hemangiosarcoma. The second most common tumour is an aortic body tumour. Differentiating between these two tumour types is important as the treatment and prognosis is quite different. Other tumour types can cause pericardial effusion however these are uncommon.

The next most common cause of pericardial effusion is idiopathic (idiopathic is the medical term meaning the exact cause remains unknown). Idiopathic pericardial effusion is associated with inflammation of the pericardial sac (an unknown viral agent may be responsible). Other causes of pericardial effusion are much less common but include infection, coagulopathy (blood clot disorder) and foreign bodies.

Cats less commonly get pericardial effusions and when they do it is normally just an incidental finding (i.e. they are not normally symptomatic for their pericardial effusion). The most common cause of pericardial effusion in cats is secondary to congestive heart failure.

Are some dogs more susceptible than others?

Pericardial effusions are more common in middle-aged to older large-breed dogs. Golden Retrievers have a high prevalence of pericardial effusion (more than any other breed).

What clinical signs are caused by pericardial effusion?

Clinical signs depend on the severity and rate of fluid accumulation but include:

- Weight loss
- Lethargy, weakness
- Exercise intolerance
- Reduced appetite
- Abdominal enlargement
- Breathing problems
- Collapse
- Death (in severe cases)

How is pericardial effusion diagnosed?

The diagnostic test of choice for pericardial effusion is echocardiography (cardiac ultrasound). The pericardium and pericardial fluid can be directly visualised. Minimal experience is needed with echo to make a diagnosis of pericardial effusion in most cases (i.e. it is not regarded as a specialist skill). Echo is also an opportunity to search for an underlying cause of the effusion such as a tumour (this requires more specialist training). The location of the tumour often provides significant clues as to the type of tumour present.



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Other tests are sometimes performed albeit these will not lead to a definitive diagnosis of pericardial effusion. Thoracic radiographs (x-rays) will often show a characteristic enlargement of the heart that is highly suggestive of pericardial effusion. If a cardiac tumour is seen on echo, thoracic radiographs may be performed to check for evidence of spread to the lungs.

What treatment is available and what is the prognosis?

First and foremost, the fluid needs to be manually removed, to alleviate the pressure on the heart (and provide clinical relief for the pet). This is performed using a technique called pericardiocentesis. This involves the use of a needle/catheter that is slowly advanced through the chest wall into the pericardial space (often under ultrasound guidance). The fluid is then removed with the aid of large syringes. Following removal of the fluid, the animal almost always feels better and is much more energetic. Complications associated with pericardiocentesis are uncommon provided it is performed by someone experienced in the procedure.

Fluid from the abdomen does not normally require removal (unless very severe and causing discomfort for the patient) because this tends to quickly resolve following drainage of the pericardial effusion.

The prognosis depends on the cause of pericardial effusion.

Hemangiosarcoma is considered to have a grave prognosis (days to weeks) and by the time of diagnosis, metastasis (i.e. spread) has usually occurred. Most owners tend to opt for palliative pericardiocentesis only (or immediate euthanasia). Although this results in marked and immediate clinical improvement, recurrence typically occurs within days, causing death or prompting euthanasia. More aggressive treatments are available (e.g. surgical resection of the tumour, chemotherapy) however the survival advantage is small (most studies only show an increased survival time of weeks to months).

Aortic body tumours in contrast tend to have a much better prognosis. These are slower growing and less likely to spread. A surgical procedure called subtotal pericardectomy is normally recommended for these patients. This involves removal of a portion of the pericardium, essentially exposing the surface of the heart to the chest cavity. This means that even if pericardial fluid keeps being produced it cannot accumulate into the small confines of the pericardial sac (because of the hole in it) and rather leaks out into the large chest cavity (the fluid in the chest cavity does not create a problem and is absorbed back into the body). Surgical pericardectomy should be performed by a specialist veterinary surgeon. Prognosis following pericardectomy has been reported up to 2 years.

Idiopathic pericardial effusion is normally treated initially with pericardiocentesis. This may be curative in a small group of dogs. However, about two thirds of dogs with idiopathic disease develop recurrent pericardial effusion one to two months following the initial episode. And many more develop recurrent effusion within 3 years of pericardiocentesis. Pericardectomy is the definitive treatment of choice for cases of idiopathic pericardial effusion (this is either recommended after the initial episode of effusion or certainly following a recurrent episode). Survival time following pericardectomy is 1-2 years on average.



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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.