

## Mitral valve disease

### Frequently asked questions

#### What type of dogs get this disease?

This very common disease affects older dogs usually after the age of 8 years. Small breed dogs are most commonly affected such as Cavalier King Charles Spaniels, Miniature poodles, Shih Tzu, Maltese, Chihuahua, Cocker Spaniels, Miniature Schnauzers, Dachshunds, Whippets, and Pomeranians. This disease can also be seen in some larger breeds and mixed breed dogs.

#### What causes mitral valve disease?

The mitral valve normally acts as a seal on the left side of the heart between the left atrium (the filling chamber) and the left ventricle (the pumping chamber), Figure 1. When the ventricle contracts, oxygenated blood is pumped around the body, and the mitral valve closes and prevents blood from going back into the left atrium.

Mitral valve disease is a degenerative condition, that over time, causes the valve edges to become thickened and knobby. The chords that tether the valve leaflets, preventing them from being pushed back into the atrium, can also develop degenerative changes causing them to elongate or rupture, Figure 2. These changes to the valve leaflets and chords will cause leakage of blood back into the atrium. The flow of blood going the wrong way is called “regurgitation”. As the left atrium becomes bigger and bigger to accommodate the extra blood from the regurgitation, increased pressure develops in the left atrium. The blood returning from the lungs into the left atrium is backed up, causing fluid to build up in the lungs. This is called congestive heart failure. Congestive heart failure can lead to difficulty breathing but can be managed with diuretic medications for a certain period of time.

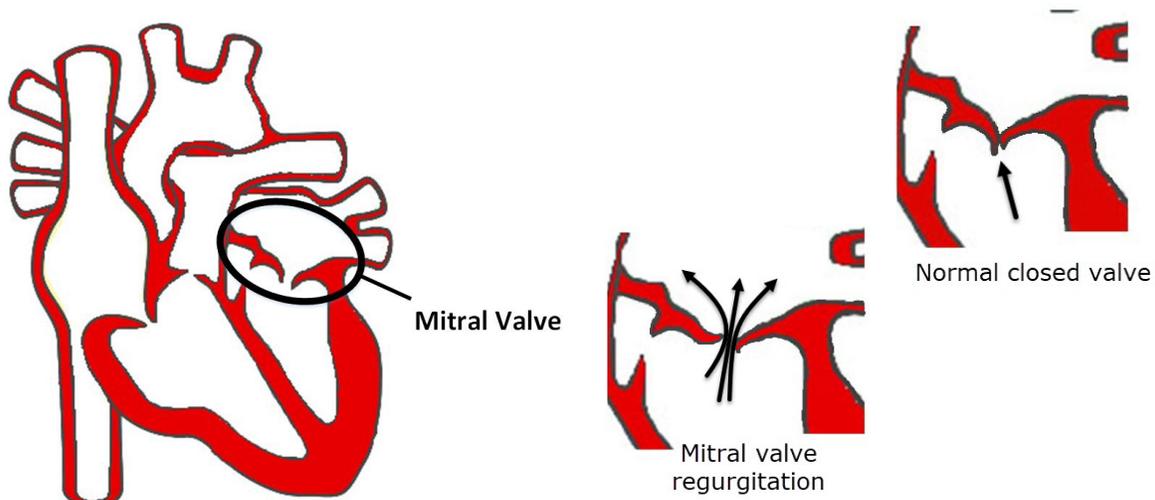


Figure 1. The canine heart- the mitral valve is on the left side of the heart between the atrium and ventricle

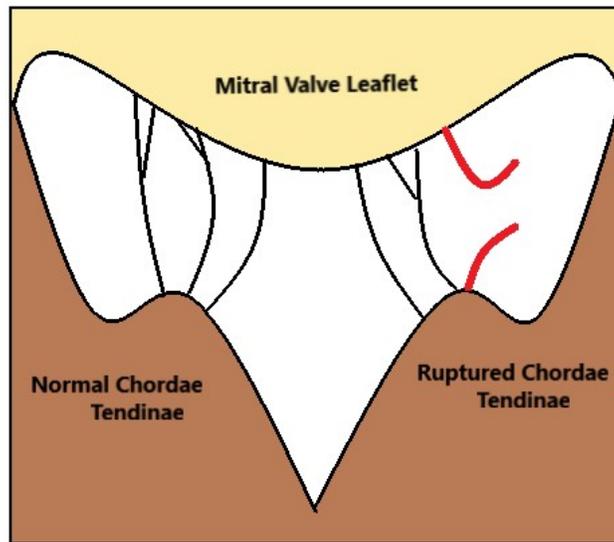


Figure 2. A schematic depicting rupture of the chords in mitral valve disease that usually tether the valve edges in place

### How is mitral valve disease diagnosed?

Mitral valve disease may be suspected by your vet based on history and physical examination (in particular a heart murmur), however, an echocardiogram (heart scan) is necessary for the diagnosis. Echocardiography can also tell us about the severity and stage/prognosis of disease.

### What are the stages of mitral valve disease?

Mitral valve disease has 4 major stages:

- Stage A: Patients at risk, no symptoms (i.e. at risk due to being a certain breed)
- Stage B1: Heart murmur heard by your veterinarian but no heart enlargement detected on echocardiogram
- Stage B2: Heart murmur heard by your veterinarian and heart enlargement detected on echocardiogram
- Stage C: Symptoms of congestive heart failure present (i.e. difficulty breathing)
- Stage D: Refractory congestive heart failure (i.e. receiving maximum doses of medications but symptoms are still present)

### How is mitral valve disease managed?

Results from a recent study (EPIC study) showed that a drug called pimobendan (“Vetmedin” or “Cardisure”) can prolong the asymptomatic period in dogs with mitral valve disease with an enlarged heart. This means that pimobendan can delay the onset of congestive heart failure (fluid in the lungs) when the disease is detected early.

Pimobendan has also been shown to prolong life expectancy when started after the development of congestive heart failure. Symptoms are usually managed with strong diuretics (furosemide, torasemide). Other medications such as benazepril and spironolactone can also be given that work in conjunction with the strong diuretics. These drugs can reduce fluid retention.

Unfortunately, medical therapy can only manage the symptoms, and the disease will continue to progress over time. Once an episode of heart failure has occurred (Stage C), average survival time is less than 1 year, depending on a variety of factors.

### **Are there other options for mitral valve disease?**

Mitral valve disease is a surgical disease, however in the past, valve repair or replacement has not had acceptable success rates. Recently, studies from a cardiac surgery group in Japan led by Dr. Masami Uechi have shown successful outcomes (> 85-90% success rates) in dogs undergoing mitral valve repair for degenerative mitral valve disease.

This group have now operated on several hundreds of dogs with consistent results and operate every 2-3 months out of a clinic in France. We would be happy to facilitate a referral to this clinic if you decided to choose this option.

### **Are there any options in the United Kingdom?**

The cardiac surgery program is currently active at the Royal Veterinary College, led by Professor Dan Brockman and we perform mitral valve repairs as well as various other heart surgeries for other conditions. Currently, we are performing surgery every two weeks but we plan to increase the frequency to every week in the near future. More information is provided in the following sections.

### **What is involved in mitral valve repair surgery?**

The aim of surgery is to reduce the leakage across the mitral valve. Over time, this will enable the heart to remodel so that the left atrium and left ventricle reduce to a more normal size. Surgery to replace the mitral valve (valve replacement) is not performed in dogs due to a high rate of complications.

Instead of a valve replacement, a valve repair is performed. This consists of replacing any ruptured or stretched chords with artificial chords made from GoreTex, Figure 3. A draw-string type of suture is also placed around the valve annulus to draw it back down to a smaller size, Figure 4. These two steps combined improve the contact between the valve edges, meaning less leakage occurs across the mitral valve. As it is a repair, the valve will not return to normal and a small amount of leakage will remain in most cases, but at a much lower level than previously.

In order to perform mitral valve repair surgery, the heart must be stopped. A heart-lung machine is used to remove blood from the body, provide it with oxygen and return it back to the body. This is called cardiopulmonary bypass.

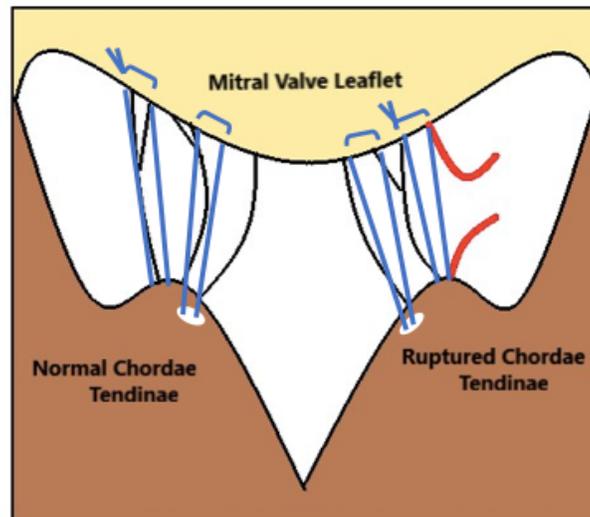


Figure 3. Replacement of ruptured/elongated chords with artificial ones

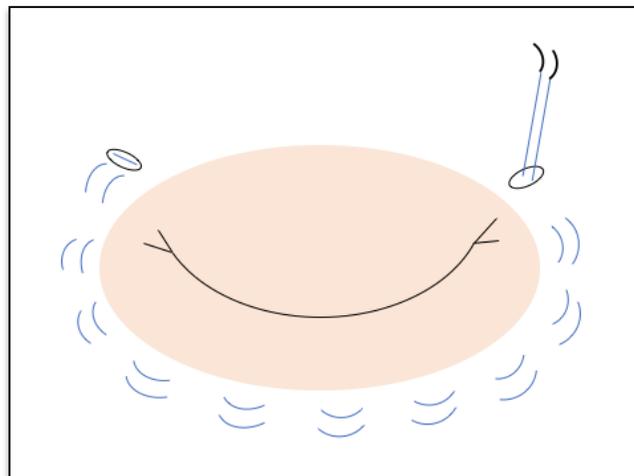


Figure 4. Placement of a draw string suture around the valve annulus to make this portion smaller, enabling the valve edges to form a better seal

### Is my dog a candidate for surgery?

There are several criteria that are used to assess if your dog could be a good candidate for surgery, including age, concurrent disease and echocardiography (heart scan) findings. We do not operate on dogs with mitral valve disease until they have experienced congestive heart failure (Stage C) as the surgery is high risk. This is because dogs with mitral valve disease who have not yet had an episode of congestive heart failure (Stage B1 or B2) may lead a good quality of life for several years before developing congestive heart failure. Dogs that have progressed into stage D are also

surgical candidates, although their chance of survival is sadly lower by this stage as the heart muscle has become severely damaged and therefore much weaker than normal.

Depending on the individual dog, the chance of a successful recovery from surgery at the RVC is between 50-83% and is assessed on a case by case basis.

### **I would like my vet to arrange a referral to the RVC. What should I expect at the consultation?**

The first visit to the hospital involves performing a 3D echocardiogram (heart scan) and performing blood tests (if not recently done). You will meet the heart surgery team including the cardiologist, surgeon(s) and team coordinator who will discuss the details of your dog's condition and the surgery with you in further detail. This visit usually takes a few hours in total and costs approximately £700-900 depending on whether blood tests and x-rays are needed.

If your dog is a suitable candidate for surgery and you would like us to perform mitral valve repair at the RVC, repeat blood test and urine tests are needed 1-2 weeks prior to surgery. This is to check for any signs of infection and to make sure liver and kidney values are normal. This can be performed either with us or at your local vets.

### **When is the surgery performed and what do I need to do prior to surgery?**

Surgeries are performed on a Monday with the option to bring in your dog on the Sunday afternoon to be admitted, or at 7-7:30 am the morning of surgery (Monday). You will be advised which medications must be stopped or continued prior to surgery. Benazepril (Fortekor) is stopped on the Saturday prior to surgery and the last evening pimobendan (Vetmedin or Cardisure) dose is given as close to midnight as possible the night before surgery. Please do not give any medications on the morning of surgery. Any joint supplements including cod liver oil and essential fatty acid supplements should be stopped at least one week prior to surgery.

### **How long will my dog stay in the hospital after surgery?**

Dogs are usually discharged from the hospital on day 10 after surgery, providing they have recovered well. During the first 10 days, patients are closely monitored as life threatening complications are most likely to occur during this time period. In order to monitor for any complications of surgery, repeat heart scans and blood tests are performed regularly. Also, medications i.e. blood thinning drugs are transitioned from injectable to tablet forms over the duration of the hospitalisation. You can visit daily during this time (other than the day of surgery) if you would like to.

### **What is involved in the aftercare?**

In a straightforward recovery, dogs are typically able to sit up, walk around and eat the day following surgery. They are kept on injectable pain relief for the first 3-4 days to keep them comfortable. At home, they must be restricted to lead walks for the first 6 weeks, with further activity restriction advised at your follow up visit. Patients go home

with one or two types of blood thinning drugs that are needed for the first 3 months after surgery to help prevent blood clots forming. They also remain on pimobendan for at least several months, sometimes for life. Diuretic medications are usually no longer required.

### How often do I come back to the RVC for recheck?

Follow up visits are performed at 1, 3 and 6 months and then yearly after surgery, providing your dog continues to do well. The cost of the first three routine visits are usually included in the cost of surgery. Thereafter they are usually on a six month to yearly basis providing all is going well and typically cost £500 thereafter. After the first visit, if your dog is doing well, follow up visits can be performed with your previous cardiologist.

### What are the potential risks for surgery?

There are three main big hurdles to successfully recovering from heart surgery. The **first** hurdle is waking up from surgery. Complications include failure of the heart to restart, excessive bleeding, lung/kidney/gastrointestinal problems from the process of the heart-lung machine and blood clots. Heart rhythm abnormalities are also a risk in the short and longer term, although this can usually be managed with medication. Blood clots are a risk in the short and medium term whilst the artificial chords and sutures are becoming covered with the body's own tissue. The **second** hurdle is the first night after surgery whilst the body is adjusting and recovering from the mitral valve repair surgery. The **third** hurdle is assessing the repair in the medium term to analyse how well the valve is now functioning and to ensure no clots or infections are forming on it. As this is a degenerative condition, depending on the severity of disease, further heart medications may be needed again in the future.

If all goes well, dogs should be living a longer and better quality of life than they would otherwise have been without surgical intervention.

### How much does the surgery cost?

The cost of the surgery, which is heavily discounted currently, is £10,000-12,000. This is the total you will pay for the surgical treatment, recovery and first few routine re-examination visits, even if your dog needs to stay in the hospital for longer or requires further management during the surgical stay.

Heart surgery is not a decision to be taken lightly and we would ask that you take some time to consider how you would like to proceed. If you have any questions during or after this time you can email [qmhahartsurgery@rvc.ac.uk](mailto:qmhahartsurgery@rvc.ac.uk) and a member of the heart surgery team will respond within 48 hours. You can also call the hospital on 01707 666 399 and ask to speak to Dan Brockman, Poppy Bristow or Anne Kurosawa.

Please see below for a link to our website if you would like some additional information: <https://www.rvc.ac.uk/small-animal-referrals/advanced-techniques-and-specialist-procedures/cardi thoracic-surgery>