Royal Veterinary College
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MITRAL VALVE DISEASE

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

Mitral valve disease is a degenerative condition that over time causes the valve edges to become thickened and knobbly. This allows leakage of blood back into the atrium. The chords that tether the valve leaflets, preventing them from being pushed back into the atrium, also elongate or rupture, allowing even more blood to regurgitate back into the atrium, Figure 2. As the atrium gets bigger from the extra blood the valve edges are pulled further away from each other, creating further leakage of blood and worsening the condition. As there is then increased pressure in the left atrium, blood returning from the lungs into the atrium gets backed up, which leads to congestive heart failure.

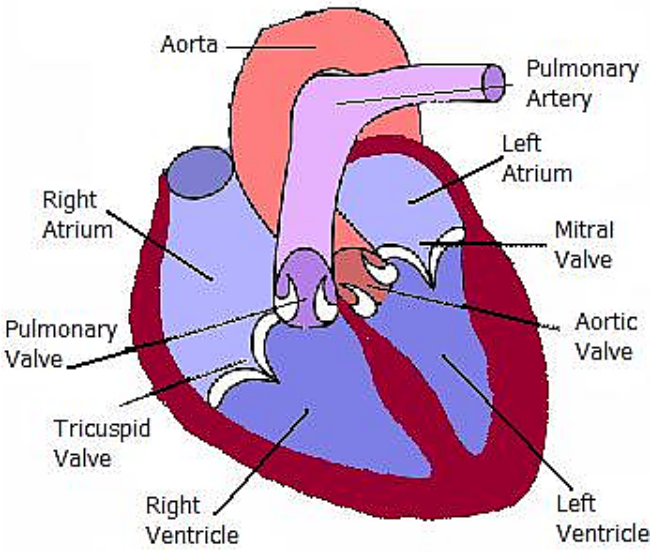

Figure 1. The canine heart - the mitral valve is on the left side of the heart between the atrium and ventricle

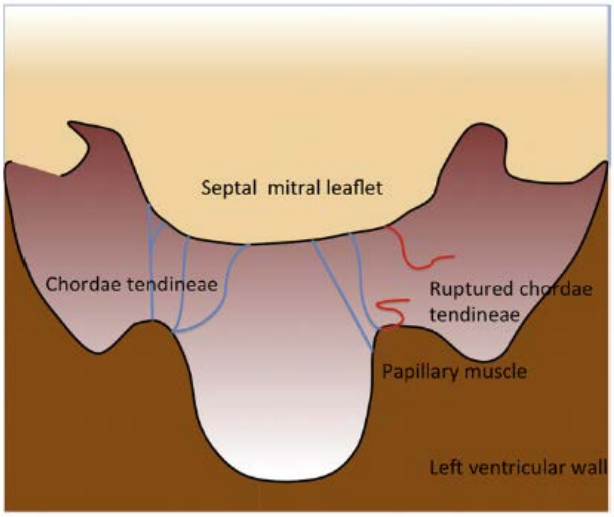

Figure 2. A schematic depicting rupture of the chords in mitral valve disease that usually tether the valve edges in place

Medical management

Medical therapy consists of starting a drug called pimobendan, typically before heart failure has developed, that has been shown to delay the onset of heart failure in affected dogs as well as prolong the life expectancy of dogs that have had episode(s) of heart failure.

Once an episode of congestive heart failure (fluid on the lungs) has occurred, a form of diuretic, for example frusemide, torasemide and/or spironolactone, are started in order to help get rid of the fluid on the lungs.

Other medication such as benazepril are usually also prescribed at various points which amongst other things helps to prevent an increase in blood pressure.

Unfortunately medical therapy can only manage the condition and it will continue to progress over time. Once an episode of heart failure has occurred (termed ACVIM stage C of disease), dogs may live around 9-12 months on average, though this can be longer (or shorter) depending on a variety of factors.

Surgical treatment

The aim of surgery is to improve the leakage in the valve which will also enable the heart to remodel, and cause the left atrium to shrink back down to a more normal size. At this time valve replacement is not able to be performed in dogs due to a high chance of developing blood clots on the new valve, rendering it incompetent within a short period of time.

Instead of a valve replacement, a valve repair is performed. This consists of replacing any ruptured or stretched chords with artificial chords made from Gore-Tex, 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. As it is a repair, the valve is not able to be made perfect and a small amount of leakage is still expected in most cases but at a much lower level than previously.

In order to perform the surgery the heart has to be stopped and a heart-lung machine is used to remove blood from the body, provide it with oxygen and return it back to the body.

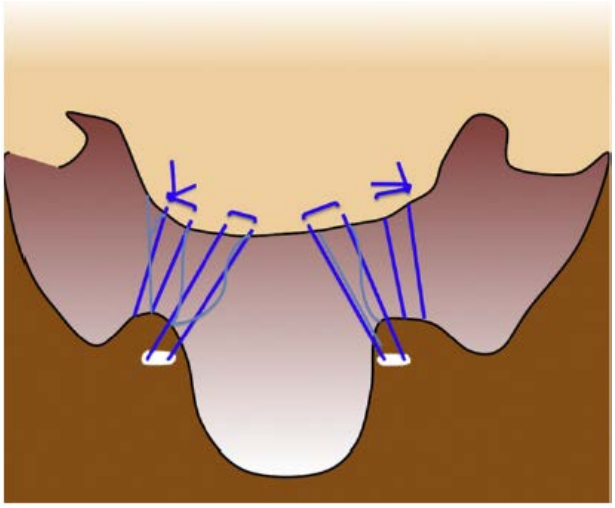

Figure 3. Replacement of ruptured/elongated chords with aritifical ones

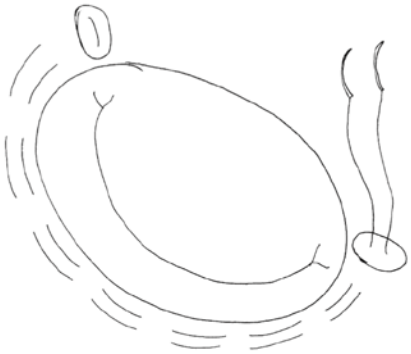

Figure 4. Placement of a draw string suture around the valve annulus to make this portion smaller, enabling the valve edges to form a better seal

Surgical candidates

There are several criteria that are used to assess if your dog could be a good candidate for surgery including age, concurrent disease and heart ultrasound findings. We do not operate on dogs for this condition until they have had one episode of heart failure (ACVIM stage C dogs), as dogs who have the disease but without having yet had an episode of failure, can lead a good quality of life for a long time before having an episode. Dogs that have progressed into stage D are also surgical candidates, though their chance of survival is sadly lower by this stage as the heat muscle has become weaker.

Depending on the individual dog, the chance of a successful recovery from surgery is around 85% and is assessed on a case by case basis.

Hospital visits

The first visit to the hospital involves performing a 3D heart ultrasound and taking some blood work (if not recently performed). 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 £500-900 depending on whether blood tests and x-rays are needed.

Two weeks prior to surgery repeat blood work and a urine sample are needed to check for any signs of a subtle infection and to make sure liver and kidney values are normal. This can be performed either with us or at your local vets.

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. You will be advised which medications must be stopped or continued prior to surgery. Fortekor (benazepril) type medications are stopped on the Saturday prior to surgery and the last Vetmedin (pimobendan) dose is given as close to midnight as possible the night before surgery. No medications need to be given by yourselves the morning of surgery. Any joint supplements including cod liver oil should be stopped at least one week prior to surgery.

Dogs are discharged from the hospital on day 10 after surgery, providing they have recovered well. The first 10 days patients are closely monitored, repeat heart ultrasounds are performed every 2-3 days and medications i.e. blood thinning drugs are transitioned from injectable to tablet forms. You can visit daily during this time (other than the day of surgery) if you would like to.

Follow up visits are performed at 1, 3, 6 months, and then yearly after surgery, providing your dog continues to do well. The cost of these visits varies depending on what needs to be performed but is usually £600-700 for the first visit and approximately £450-500 thereafter. After the first visit, if your dog is doing well, follow up visits can be performed with your previous cardiologist.

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 Vetmedin for at least several months, sometimes for life. Diuretic medications are usually no longer required.

Potential risks

There are three main big hurdles to recovering from heart surgery. The first hurdle is waking up from surgery and risks include failure of the heart to restart, bleeding, and 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, though usually this can 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 of surgery whilst the body is adjusting to the process and the repair. 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. Depending on your dog's age at the time of surgery, and degree of disease it is possible as this is a degenerative condition that 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.

The cost of the surgery is heavily subsidised by the hospital and is currently £15,000. This is a capped fee - if your dog needs to stay in the hospital for longer or requires further management during the surgical stay then this is included in this cost.

Heart surgery is not a decision to be undertaken 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 qmhaheartsurgery@rvc.ac.uk and a member of the heart surgery team will respond within 48 hours.