



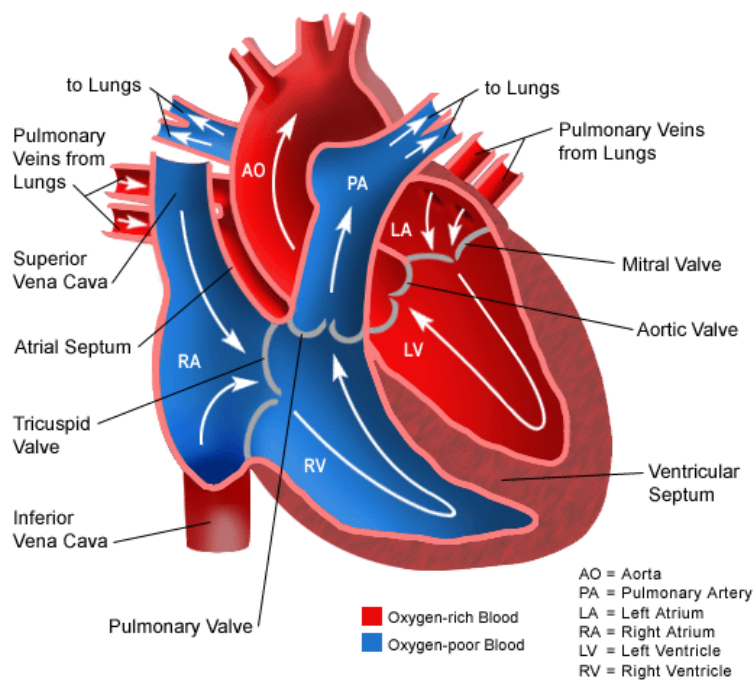
Pulmonic Stenosis

BRIEFLY, HOW DOES THE HEART WORK?

The heart has four chambers. The upper chambers are called atria. One chamber is called an atrium, and the lower chambers are called ventricles. In addition to the upper and lower chambers, the heart is also considered to have a right and left side.

Blood flows from the body into the right atrium. It is stored there briefly, then pumped into the right ventricle. The right ventricle pumps blood into the lungs, where it receives oxygen. It flows from the lungs into the left atrium; it is held here briefly before going into the left ventricle. The left ventricle contains the largest muscle of the heart so the blood can be pumped out to all parts of the body.

Movement of blood results from electrical impulses that are transmitted from the brain to the heart. The impulses not only direct the heart to beat but also to maintain a steady, regular rhythm.





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WHAT IS PULMONIC STENOSIS?

Pulmonic stenosis is an obstruction of the right ventricular outflow, usually caused by a congenital defect, although some forms can occur secondary to a thickening of the heart wall or mass.

The stenosis (narrowing) is caused by the abnormal formation of nodules, or a fibrous ridge, or ring of tissue. The heart therefore has to work harder to pump an adequate supply of blood from the right ventricle through the narrowed area to the lungs, which can cause a thickening of the right ventricle muscle wall. The blood squirts through in a turbulent fashion (like if you squeezed down on a garden hose) and creates the sound known as a heart murmur.

The obstruction can occur in one of three different places:

- Subvalvular: within the right ventricle, upstream of the pulmonary valve, most commonly associated with excess or thickened muscle wall in the right ventricle.
- Supravalvular: within the pulmonary artery, downstream of the pulmonary valve.
- Valvular: This is the most common form of pulmonic stenosis and involves a deformed pulmonary valve itself due to the valve leaflets being too thick or displaced, the opening too narrow, or a fusion of the valve cusps.

HOW COMMON IS PULMONIC STENOSIS?

Pulmonic stenosis is the third most common congenital heart disease in dogs. It can be accompanied by additional heart defects, or can be mild enough to be no more than an incidental finding. Occasionally cats are also affected.

Pulmonic stenosis is a congenital or hereditary disease, which commonly affects certain breeds. These are;

- Beagles
- Boxers
- Chihuahuas
- Cocker Spaniels
- English Bulldogs
- Fox Terriers
- Keeshunds
- Mastiffs
- Miniature Schnauzers
- Samoyeds
- West Highland White Terriers

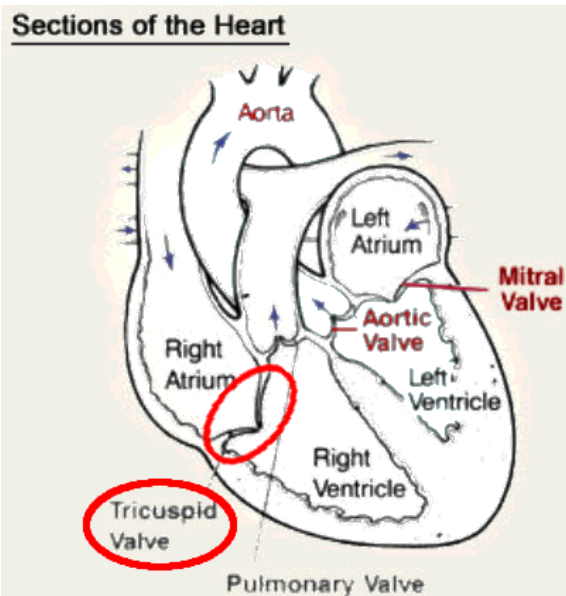
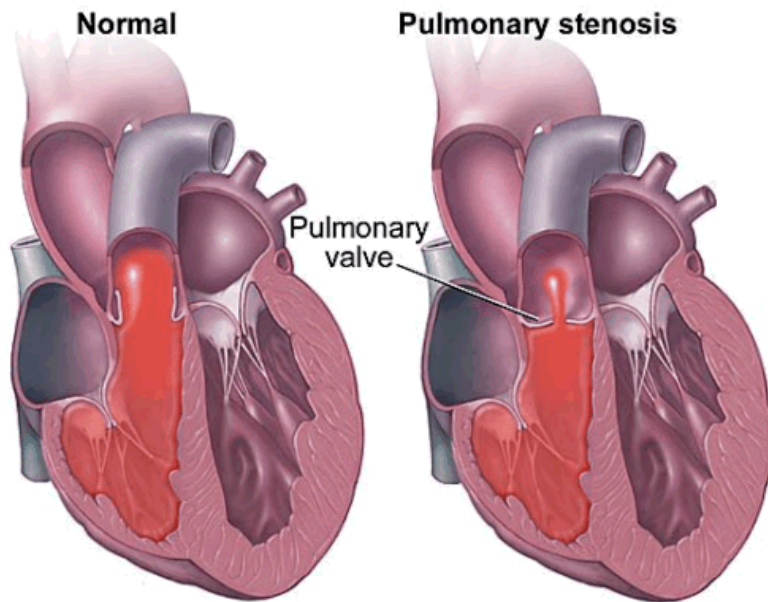




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(Bulldogs and Boxers are occasionally born with a coronary artery that wraps around the pulmonary artery. Dilation of a stenosis in this particular example can result in a rupture of the coronary artery and death.)

WHAT ARE THE CONSEQUENCES OF PULMONIC STENOSIS





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A mild case of pulmonic stenosis is of little concern and doesn't usually affect life expectancy. Luckily most cases are mild and do not require treatment; fairly severe diseases is needed for clinical signs to appear.

Unlike other stenoses, fainting and sudden death are uncommon.

An especially harmful case of pulmonic stenosis can cause the right ventricle to thicken and grow due to the excess work, thus interfering with the chamber's flexibility and ability to fill. This in-turn can cause a leak in the tricuspid valve resulting in a back up of fluid in the abdomen (right sided congestive heart failure).

WHAT ARE THE SIGNS OF PULMONIC STENOSIS?

The earliest sign of pulmonic stenosis is a heart murmur. This is produced by turbulent blood flow and, in this instance, is usually quite loud due to the obstruction of the pulmonic valve.

***Note: Puppies under 16 weeks of age sometimes demonstrate what is called a 'physiological' or 'innocent' murmur. These are quiet murmurs and disappear as the puppy gets older; any murmur that persists after this age or is felt to be loud should be pursued.*

When the heart is not adequately pumping blood to the lungs, the animal may become lethargic or have a lack of stamina when exercising.

Approximately 35% of dogs with sever pulmonic stenosis will show some or all of the following signs;

- Change in heart rate or rhythm (heart murmur)
- Increased or laboured respiration at rest (normal sleeping respiratory rate is less than 30 breaths per minute)
- Decreased appetite
- Lethargy/weakness or fainting spells
- Distended (bloated) abdomen from fluid accumulation
- Blue-tinge to the gums especially with exertion





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HOW IS PULMONIC STENOSIS DIAGNOSED?

The best way to diagnose pulmonic stenosis is to perform an echocardiogram (heart ultrasound). This gives the most accurate determination of the size of each heart chamber, the thickness of heart walls, a visual on valves and a look at the direction and velocity of blood flow through the chambers.

Occasionally a chest xray and ECG (electrocardiogram) may be recommended. These give us the best look at the heart size and an assessment of the electrical activity of the heart.

The combination of all of these tests gives us our best evaluation of the animal's heart function, however if cost considerations prohibit us performing all of them, two or three will provide much valuable information.

IS THERE TREATMENT FOR PULMONIC STENOSIS?

After the diagnosis of pulmonic stenosis is made, it is important to grade its severity. This is done with the use of the ultrasound and measures the pressure gradient across the pulmonic valve. If the pressure gradient is less than 40 millimeters of mercury (mm of Hg) than no treatment is required. A gradient of 80mm of Hg or more is at risk of sudden death and therapy should be pursued.

Balloon Valvuloplasty is a minimally invasive procedure that involves inserting a special balloon catheter into the pulmonic valve and inflating it. This, if successful, will break down the obstruction.

Dogs with a pressure gradient of 80mm of Hg or more will require this regardless of whether or not they are showing clinical signs, likewise animals with tricuspid valve insufficiencies will benefit regardless of their pressure gradients. Beta Blockers will also be prescribed prior to the valvuloplasty to reduce the chance of electrical abnormalities during the procedure.





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HOW MUCH LONGER WILL MY PET LIVE?

There are many factors that must be considered before this question can be answered and there are a couple of supportive measures that can be taken to potentially increase the animal's lifespan.

Performing a balloon valvuloplasty reduces the risk of sudden death in severe cases by 53% and will improve quality of life. Certain types of deformity are not amenable to this treatment such as in the case of coronary artery involvement, and prognosis is better without attempted therapy.

Beta blockers may lessen the effects of the stenosis and possibly prolong life.

Exercise should be moderated as there is a strong correlation between sudden death episodes and pulmonic stenosis patients undergoing strenuous activity or excitement.

PREVENTATIVE MEASURES

Animals with pulmonic stenosis should not be bred as the condition is likely inherited in predisposed breeds.

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