

# PULMONIC STENOSIS

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## Description

Pulmonic stenosis is a narrowing in the region of the “pulmonary valve” which lies between the right side of the heart and the lungs. “Stenosis” is the medical term for narrowing. The pulmonary artery carries blood from the right heart to the lungs so that it can get oxygen which is then carried to the rest of the body. The narrowing impairs normal blood flow to the lungs. The narrowing can occur within the valve itself (valvular) - the most common site; below the valve (subvalvular); or above the valve in the pulmonary artery (supra-valvular) - rare. Sometimes more than one form is seen in an individual and, although usually an isolated problem, pulmonic stenosis can occur with other defects. Pulmonic Stenosis is one of the components of another birth defect called “Tetralogy of Fallot.”

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## History and presenting signs

Affected puppies sometimes show no external signs of the disease at first, and the problem is frequently diagnosed during routine examination by your veterinarian. However, if blood flow is seriously impaired, signs of abnormal heart rhythms can be seen, including tiring with exercise and fainting. The medical term for fainting is “syncope” or “syncopal episode.” Though right sided congestive heart failure can possibly be caused by pulmonic stenosis, it is rare. It is more often that abnormal heart rhythm causes problems long before congestive heart failure develops. If pulmonic stenosis is so severe that it becomes life threatening, sudden death is more likely to end the life of a dog with pulmonic stenosis than gradual decline in health due to right sided heart failure. The medical term for abnormal heart beats is “arrhythmia.” A severe arrhythmia can cause sudden death by stopping the heart. In the unusual case that right sided heart failure might develop, symptoms can include shortness of breath due to build-up of fluid around the lungs, and swelling of the abdomen due build-up of fluid.

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## Physical examination

An abnormal heart sound (called a murmur) caused by turbulence in the blood may be heard when listening with a stethoscope. The murmur occurs when the heart contraction forces blood out into the pulmonary artery through the narrowed spot.

## Electrocardiography (ECG)

On ECG (the same as EKG) there can be periods of increased heart beat rate, as well as abnormal heart beats. These problems result from poor blood supply to the heart muscle due to lack of oxygen, and thickening of the right side of the heart. The thickening occurs because the heart muscle is working harder than usual to push the blood out through the narrowed opening.

## **X-Ray**

Enlargement of the right side of the heart may be seen and, in some cases, bulging of the pulmonary artery can be seen on a chest x-ray.

## **Echocardiogram**

An echocardiogram is simply an ultrasound of the heart. An echocardiogram (“echo” for short) will show enlargement of the pulmonary artery, narrowing near the pulmonic valve and thickening of the right side of the heart. A special feature called “doppler” is necessary to determine how severe the problem is. The difference of pressure across the narrowing will tell whether the problem is mild (less than 60 mm Hg), moderate (60-80 mm), or severe (greater than 80 mm Hg). Dogs with mild pulmonic stenosis usually live a relatively normal life. Dogs with moderate pulmonic stenosis can do well for long periods time on medications. Dogs with severe pulmonic stenosis often do not live for more than a few months to a few years. Fainting is usually a sign that pulmonic stenosis is at least moderate to severe. Fainting multiple times every day often means that pulmonic stenosis is very severe.

## **Angiogram**

Angiogram is a special x-ray of the heart taken after injecting dye into the vein. This procedure is very helpful to confirm the diagnosis, and is usually done by a specialist in veterinary cardiology. Angiograms of dogs with pulmonic stenosis will usually show thickening of the right side of the heart, enlargement of the pulmonary artery and narrowing of the pulmonic valve and/or pulmonary artery.

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## **Dogs**

In dogs pulmonic stenosis is one of the most frequently recognized congenital cardiac abnormalities in dogs, estimated to occur in 1/1000 puppies. “Congenital” is the medical term for birth defect. One study cited Chihuahuas, English Bulldogs and Fox Terriers as having a higher rate of pulmonic stenosis than the general population (*Patterson Dog. Circ.Res 23:171, 1968*). Another report (*Canine & Feline Cardiology by Phillip R Fox 1988*) also cites Beagles, Samoyeds and Cocker Spaniels as having increased risk. In a recent publication in the UK (*Diseases of the Cardiorespiratory System by Mike Martin and Brendon Corcoran, 1997*) the Miniature Schnauzer and Boxer are also listed as being commonly affected. Pulmonic stenosis has been shown to be hereditary in Beagles. “Hereditary” means that it is in the genes, and can be passed down from the parents to the offspring.

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## **Treatment**

Severely affected cases can be treated using a technique called balloon valvuloplasty in which a catheter with a small balloon on the end is guided through the blood vessels to the position of the narrowing, and the balloon is then inflated to open the constriction. This procedure appears to work well in many cases, if the pressure gradient can be reduced to the mild to moderate level (less than 80 mm Hg). There is another birth defect called the “coronary artery defect” which makes it impossible to do the balloon procedure. Angiogram is required in order to tell if a puppy with pulmonic stenosis also has the coronary artery defect.