

Subaortic Stenosis (SAS)

Subaortic stenosis, or "SAS," is the most common congenital heart disease of large breed dogs. The most commonly affected breeds for SAS include the Golden retriever, Rottweiler, Newfoundland, Great Dane, Boxer, German Shepherd, and German Short-haired pointer.

In SAS, the left ventricular outflow tract just below the aortic valve has a scar-like narrowing or "stenosis". This means that the left ventricle must pump extra hard to move the correct blood volume through the narrowed area. The blood squirts through in a turbulent fashion (like squeezing down on a garden hose) that creates a sound known as a heart murmur. While any cause of turbulent blood flow can be heard as a murmur, and a murmur does not always indicate disease is present, the murmur is usually the first sign that the puppy might have SAS. In a young puppy, the stenosis is very small, barely a ridge near the valve, but over the first four to six months of life the stenosis grows and the murmur often becomes more apparent.

The murmur is best heard on the left side of the chest near the base of the heart. Generally, the louder the murmur, the worse the stenosis. Over time, the muscle of the left ventricle thickens and grows due to the excess work it must perform. Eventually this interferes with the pumping chamber's flexibility and ability to fill. Abnormal muscle in the heart makes for abnormal electrical conduction in the heart and soon the heart's normal electrical rhythm may be disrupted. These pumping and electrical issues can lead to fainting spells or even sudden death. How long a dog with SAS lives is very much a function of how severely the outflow tract is narrowed. Most dogs with severe SAS do not survive beyond age 3 years without treatment, though dogs with milder cases can have normal life spans. A dog with SAS is always predisposed to electrical arrhythmia and sudden death, heart failure, or infection of the abnormal aortic valve.

Chest radiographs are helpful in assessing actual heart failure, and may even show a dilation of the aorta near the valve (caused by the high pressure squirt of blood through the narrowing). This said, the real key to diagnosis is ultrasound (echocardiography) where the heart's chamber sizes and wall thicknesses are measured. The information gathered is generally adequate to confirm the diagnosis though a mild case might have values that overlap the normal range. Such a patient might have to be followed over time. A special kind of ultrasound called "Doppler" is particularly helpful in measuring the severity of the stenosis. A pressure gradient across the aortic valve below 40 mmHg is considered mild, between 40 – 80 (90) mmHg moderate, and above 90 mmHg severe. Depending on the severity, your dog may show some or all of the following signs:

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| *Heart murmur | * Tiring easily | *Coughing | *Fainting spells | *Blue-tinge to |
| the gums especially with exertion | | * Sudden death | | |

Treatment: Drugs

The goal in treating SAS is to create normal ability to exercise and normal life span. The most popular class of drug for SAS is the "beta blockers." Beta receptors are the neurologic areas on the heart that respond to epinephrine and cause the heart rate to speed up during exercise. In SAS, this kind of racing pulse is what leads to the abnormal electrical rhythm (and ultimately fainting). It is hoped that the beta blockers will keep the heart from racing. Of all the treatment options available for SAS, a beta blocker such as atenolol is certainly the least invasive and least expensive, but studies are on-going to determine if it is also the most effective. At this time, invasive procedures cannot be recommended over medication.

Treatment: Surgery

Open heart surgery is uncommonly performed in dogs but it is possible to surgically excise the collar of scarring that is narrowing the outflow tract. One would think this would solve the whole problem, but in fact resulting survival times are similar to those for dogs simply taking beta blockers.

Treatment: Balloon Valvuloplasty

With balloon valvuloplasty, the patient is anesthetized and a type of catheter is threaded into the heart so that it spans the stenosis. The catheter has a tough balloon at the end that is then inflated, breaking down the scarring and dilating the stenosis. (Think of using a shoe stretcher in too-tight shoes.) Again, one would think that this would solve the problem, but survival times are similar to those for dogs simply taking beta blockers.

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