



# EAST COAST VETERINARY CARDIOLOGY

## Subaortic Stenosis

Subaortic stenosis (SAS) is a common congenital heart disease identified in the larger breed dogs (such as Boxers, Newfoundlands, Retrievers, Shepherds, Rottweilers and other larger breeds). It is estimated that approximately 35% of canine patients with congenital cardiac disease have SAS. It is a rare congenital defect in cats. As the name implies, the defect is located beneath the aortic valve (the valve which separates the left ventricle from the aorta) and consists of a narrowing (or 'stenosis') made of a fibrous or muscular ridge/ring of tissue. This means that the left ventricle must generate a greater force of contraction (pump harder) to move the blood through the narrowed region. This results in turbulent blood flow as it moves through the narrowed area (if you squeeze down on a garden hose think of what happens to the water flow) resulting in an audible heart murmur. A definitive diagnosis of SAS is made via an echocardiogram (heart ultrasound).



When a puppy with SAS is born, the narrowed area (stenosis) is very small – however, as the puppy grows and matures, the stenosis also 'grows', and the murmur will become more apparent (louder). Murmurs associated with SAS correlate with the severity of the disease – the more significant the narrowing (and therefore more severe the disease), the louder the heart murmur. Once the dog has reached maturity (fully grown), the degree of narrowing does not worsen. However, with time, the muscle of the left ventricle must thicken and grow in order to keep up with the increased work it must

perform in order to pump blood out of the heart to the body. As the muscle becomes thicker, the blood vessels that supply the heart muscle with oxygen and essential nutrients (the coronary arteries which are located on the exterior of the heart muscle) cannot reach all the muscle of the left ventricle, leading to muscle cell death and scar tissue formation. This scarring of the heart muscle

can cause disruption in the electrical conduction within the heart, leading to an irregular heart rhythm (arrhythmia). Severe arrhythmias can place dogs with SAS at risk for sudden death.

The prognosis for the disease depends on how severe the narrowing of the outflow tract is – dogs with severe narrowing may not survive past three years of age, whereas dogs with mild narrowing are expected to have a normal lifespan with no negative impact on quality of life. Dogs with moderate stenosis can often do very well but may carry some risk for arrhythmias long term.

There is no cure for the disease and treatment is aimed at reducing heart rate to allow more time for the heart to fill with blood in severe cases and therefore allow more oxygen to reach the thickened heart muscle. Generally, a medication known as a beta blocker (such as atenolol) is prescribed. Beta blockers may also reduce the oxygen demand of the heart muscle itself. Despite these benefits, studies evaluating beta blocker therapy in dogs with SAS have had mixed results. This is a common human heart medication that is well tolerated in dogs. If arrhythmias are documented in patient with SAS, then additional medications such as anti-arrhythmics may be added. It is unknown whether anti-arrhythmic treatment will protect affected individuals from the risk of sudden death. As this disease is heritable, it is not recommended to breed animals known to have SAS.

Unfortunately, surgical options for correction of SAS are limited at this time – minimally invasive surgeries have been explored using high pressure balloon catheters that are positioned across the stenosis to try to score/cut it. Studies to date using these techniques have found that the stenosis often recurs (re-stenosis) over time and the benefit on long term survival has not yet been determined.

Due to concern for endocarditis (heart valve infection), prophylactic antibiotics are recommended for patients with SAS for any “dirty” procedure, such as dentistry, gastrointestinal surgery or wound repair. Urinary tract infections (UTI) may also pose some risk for endocarditis in dogs with SAS therefore UTIs in these patients should be treated aggressively with urine cultures to help guide appropriate antibiotic therapy. The occurrence of endocarditis in dogs with SAS is presumably a result of chronic damage/injury to the aortic valve itself due to the high blood flow velocity across the aortic valve in dogs with SAS.

Patients with mild to moderate SAS are often asymptomatic. Dogs with severe SAS may have signs of exercise intolerance, fainting with exertion and trouble breathing/coughing. Dogs with SAS who develop respiratory difficulty have typically progressed into left sided congestive heart failure (CHF) where there is fluid accumulation (pulmonary edema) within the lungs. Once a dog with SAS develops CHF, the prognosis is guarded with most dogs living less than 1 year once CHF develops.

## Key Points

SAS is one of the most common congenital defects diagnosed in the dog. It is rare in cats.

SAS is due to a fibrous or muscular ridge/ring of tissue that is present beneath the aortic valve, making the outflow tract blood flows through smaller.

The more severe the narrowing with SAS the more severe the heart murmur.

Dogs with severe disease may have clinical signs of exercise intolerance and fainting.

There is a risk for sudden death (due to an arrhythmia) or CHF in dogs with severe disease.

Dogs with mild-moderate SAS generally do well in the long term.

Beta blockers are generally prescribed in dogs with severe disease to slow the heart rate and improve oxygen delivery to the heart muscle.

Dogs with SAS have a higher risk of aortic valve endocarditis (infection of valve). Therefore antibiotics are used for dirty procedures and any chronic infections should be treated aggressively.

