



EAST COAST VETERINARY CARDIOLOGY

Pulmonic Stenosis

Pulmonic stenosis is a common cardiac congenital defect diagnosed in the dog. It is rarely diagnosed in cats – studies have shown that less than 10% of cats with congenital cardiac disease have pulmonic stenosis. The disease is characterized by a dysplastic (abnormally formed) pulmonic valve which becomes thickened and irregular, with tethered and abnormal motion. This creates a narrowing (stenosis) at the level of the valve which impedes the flow of blood across the valve and into the pulmonary artery. Due to this resistance to blood flow, the right ventricle (RV) becomes concentrically hypertrophied (thickened) and dilated due to this chronic pressure overload.

Animals with pulmonic stenosis will have heart murmurs that correlate with the severity of their stenosis – animals with more severe narrowing will have much louder heart murmurs. A definitive diagnosis of pulmonic stenosis is made by performing an echocardiogram, a non-invasive ultrasound of the heart. The echocardiogram will determine the severity of the disease which will help determine the prognosis of the disease.



Clinical signs in patients with pulmonic stenosis are variable – generally those with mild disease are asymptomatic. Animals with moderate or severe disease may exhibit signs of exercise intolerance, fainting with exertion, trouble breathing or abdominal distension. Some may develop cyanosis – this occurs when there is also a small hole present within the heart between the right and left atrium called a patent foramen ovale. This opening allows deoxygenated blood to

flow from the right into the left atrium, reducing the amount of oxygen in the systemic circulation leading to hypoxia and cyanosis.

Animals with mild to moderate disease generally do well in the long term and may not have their natural lifespan affected by the disease. There are several potential consequences in animals with severe pulmonic stenosis. Due to the RV hypertrophy, the walls of the ventricle become stiff and non-compliant, leading to impairment to heart filling and what is called diastolic dysfunction. This

increases the risk of right sided congestive heart failure (CHF) in patients with severe disease. Right sided CHF is typically associated with fluid retention in the abdominal cavity (ascites) and sometimes within the chest cavity (pleural effusion). Arrhythmias may also occur in animals with severe disease due to the severe thickening of the right ventricle – ventricular arrhythmias can predispose affected animals to sudden death. Long term prognosis is typically guarded for patients with severe disease, due to the risk of congestive heart failure, arrhythmias and sudden death.

In terms of treatment, balloon valvuloplasty to tear open the abnormal pulmonic valve is considered the best option in animals with moderate to severe disease. This is a minimally invasive surgery where a special balloon catheter is positioned across the valve and subsequently inflated to tear the valve. This will lessen the workload placed on the right heart and help to alleviate clinical signs. Studies to date have shown that successful balloon valvuloplasty significantly improves survival and reduces clinical signs in dogs with pulmonic stenosis. There are risks during the procedure (particularly arrhythmias) and in some cases, the balloon is not able to tear the valve sufficiently enough to reduce the workload on the right ventricle. This procedure is offered at many specialty and veterinary teaching hospitals.

In certain brachycephalic (short nose) dog breeds, particularly Bulldogs, pulmonic stenosis is associated with an abnormal anatomy of the coronary arteries. In these dogs, the left coronary artery does not originate from the proper location off the aorta – instead, it arises off the right coronary artery. Due to this abnormal origin, the left coronary artery travels a different course to the left ventricle where it entraps the pulmonary artery. This is known as an R2A coronary anomaly. Balloon valvuloplasty is not recommended in these animals due to a risk for avulsion of the left coronary artery during the procedure that may lead to hemorrhage and death.

Medical treatment of pulmonic stenosis may be pursued in some patients and typically entails the use of a beta blocker called atenolol. This is a common human heart medication that is well tolerated in animals. The beta blocker slows heart rate and limits the workload placed on the right ventricle – it may also help treat certain arrhythmias. Medical management is generally considered in animals who are not considered candidates for balloon valvuloplasty and in those cases that balloon valvuloplasty was not successful.

If a patient with pulmonic stenosis develops right sided CHF, diuretic and ACE inhibitor therapy is typically prescribed as well. Removal of the retained fluid (centesis) can also be considered to help improve patient comfort, especially in those with abdominal fluid retention.

Key Points

Pulmonic stenosis (PS) is a common congenital cardiac defect in dogs and is rare in cats.

PS is due to dysplasia (malformation) of the pulmonic valve leading to a narrowing (stenosis) at the valve.

The narrowing of the valve leads to increased workload of the heart muscle, leading to thickening (hypertrophy) of the right ventricle.

Patients 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 patients with severe disease. CHF is associated with fluid retention typically in the abdomen and sometimes the chest cavity.

Animals with mild-moderate PS generally do well in the long term.

Animals with severe PS are best treated with balloon valvuloplasty which has been shown to improve the outcome in affected patients.

In brachycephalic breeds, the stenosis may be related to a coronary artery anomaly (R2A) where an abnormal left coronary artery entraps the pulmonary artery.

Beta blockers are prescribed in patients who may not be candidates for valvuloplasty.

