



EAST COAST VETERINARY CARDIOLOGY

Ventricular Septal Defects



A ventricular septal defects (VSD) is a congenital cardiac defect noted in both the dog and cat. While they are uncommon in dogs, they are the most common cardiac congenital defect diagnosed in cats (upwards of 50% of cats with congenital cardiac disease have a VSD). They are characterized by a hole in the interventricular septum which is the wall between the left and right ventricles. This defect will allow communication and flow of blood between these two heart chambers. Generally, the blood will flow through the defect from the left into the right ventricle as the pressures are inherently higher on the left sided of the heart. Often in animals the defects are located in a portion of the interventricular septum that is thinner (perimembranous septum) but occasionally they can occur in the more muscular portion of the septum. VSDs are definitively diagnosed using an echocardiogram (non-invasive cardiac ultrasound).

Patients with a small VSD typically have very intense heart murmurs whereas animals with large defects have low grade murmurs. This occurs because small defects impose higher resistance to blood flow making the speed of flow higher and more turbulent across the defect. It has been reported that typically animals with small VSDs do not have long term deleterious effects related to their defect. This reflects the small size of their defect and the relatively small amount of blood shunting from one side of the heart to the other. When the defects are larger, there can be more considerable left to right shunting of blood, which leads to volume overload of the pulmonary arteries and the left heart and can therefore lead to possible left-sided congestive heart failure in these patients (CHF). CHF is typically associated with fluid retention within the lungs called pulmonary edema. Some patients can also develop a condition called pulmonary hypertension (high blood pressure in the pulmonary arteries) due to the chronic increased volume of blood flowing through the pulmonary arteries. This can in rare cases lead to reversal of blood flow through the defect (becomes right to left) which can lead to less oxygen delivery to the tissues (hypoxia) as a result of mixing of deoxygenated blood from the right ventricle with oxygenated blood in the left ventricle.

Treatment options for animals with VSDs are limited in veterinary medicine. When the defects are small, generally no treatment is required. In some cases, and depending on the location of the VSD, a minimally invasive surgery to deliver an occluder (plus) across the VSD can be considered. This procedure requires advanced experience and specialized equipment and is only offered at a handful of locations in North America. For those animals with large VSDs, a vasodilator may be prescribed. This medication lowers the blood pressure and may help to limit the degree of left to right shunting of blood through the VSD. If CHF develops, then diuretic and ACE inhibitor therapies are also prescribed.

Clinical signs of a VSD in an animal depends on the size of the defect, the volume of blood flow across the defect, and if pulmonary hypertension is present. Animals with small defects are generally asymptomatic. In animals with significant flow across the defect who develop CHF, signs of labored breathing, coughing and exercise intolerance may be noted. In those patients who develop pulmonary hypertension, signs of labored breathing, exercise intolerance, fainting, abdominal distension and cyanosis may be noted.

Prognosis is good for animals with small VSDs that limit blood flow between the ventricles (restrictive VSDs) with many affected animals living a normal natural lifespan. If CHF develops in those animals with large VSDs, prognosis is guarded – in these patients, CHF can often be managed for 1-2 years. If pulmonary hypertension develops with development of cyanosis, prognosis is often guarded.



Key Points

VSDs are holes present in the interventricular septum of the heart which leads to communication and blood flow between the left and right ventricles.

It is the most common congenital cardiac defect diagnosed in the cat.

Animals with small VSDs have very loud heart murmurs.

Prognosis is good for animals in the long term with small VSDs.

Animals with large VSDs can be at risk for left sided CHF and the development of pulmonary hypertension.

Pulmonary hypertension can lead to reversal of blood flow across the defect allowing deoxygenated blood from the right ventricle to mix with oxygen rich blood in the left ventricle.

Clinical signs in animals with large VSDs can include labored breathing, coughing (dogs), exercise intolerance, fainting and cyanosis.

Some hospitals in North America have closed large VSDs in dogs with an occluder via a minimally invasive surgery with good outcomes.

