EAST COAST VETERINARY CARDIOLOGY

Sick Sinus Syndrome

Sick sinus syndrome (SSS) is an acquired disease of the conduction (electrical) system which is typically diagnosed in geriatric dogs. The Miniature Schnauzer, West Highland White Terrier and Cocker Spaniel are three breeds which are commonly diagnosed with SSS.

In a normal heart, the stimulus to cause the heart to contract originates from a collection of specialized cells called the sino-atrial (SA) node which is located within the right atrium. This is considered the pacemaker (command centre) of the heart and sets the rhythm and rate of the heartbeat. After the SA node depolarizes (fires), the electrical signal travels through the atria and enter the lower heart muscle chambers (ventricles) through the atrio-ventricular (AV) node. In animals with SSS there is dysfunction of the SA node and in some cases, the AV node is also involved. The exact etiology is unknown, but it has been shown that in affected Schnauzers the pacemaker cells in the SA node are replaced largely by fibrous (scar) tissue. As a result of this infiltration of the SA node it begins to depolarize haphazardly in an irregular fashion. Many animals with SSS will have a slower than normal heart rate with frequent pauses between heartbeats. Affected animals may occasionally have periods of tachycardia (fast heart rates). When the AV node becomes involved, the electrical signal is blocked and does not enter the ventricles leading to failure of activation of the ventricles. This further contributes to a slower than normal and irregular heart rate/rhythm.

Affected animals with SSS will typically present with signs of exercise intolerance, weakness, lethargy (sleeping more) and fainting. Sudden death related to SSS is uncommon. Some animals may be asymptomatic in the early stages of the disease and will be detected by a veterinarian during a routine physical examination.

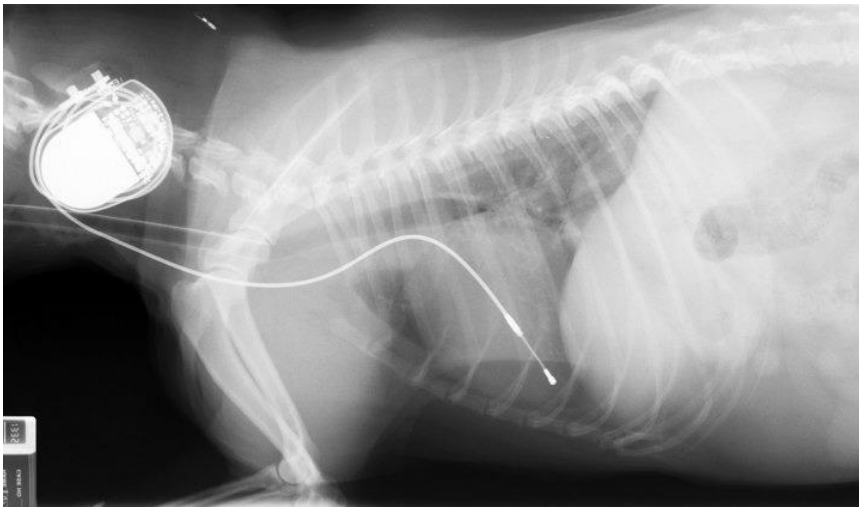
SSS is diagnosed by performing an electrocardiogram (ECG). An ECG allows analysis of the rhythm of the heart and allows for determination of irregularities in the conduction system of the heart. Generally, animals that are suspected to have SSS will also have an atropine response test. This is when atropine is given to try to stimulate the SA node to assess its function. A normal atropine response test is when the heart rate doubles from the pre-treatment rates and any noted pauses resolve. In animals with SSS, they typically have a suboptimal response to atropine or have no response at all. Echocardiography may be performed to rule out any structural heart changes that may be influencing the heart rhythm.

An ambulatory ECG (called a Holter monitor – pictured above – these are the type of Holter monitors utilized by ECVC) is frequently used to evaluate dogs suspected to have SSS as it allows evaluation of heart rhythm over a full 24-hours. Most dogs

tolerate wearing a Holter monitor without issue. Holters are also useful when dogs are fainting related to SSS to determine if the cause of their fainting is periods of bradycardia or tachycardia. For those animals having both bradycardia and tachycardia contributing to episodes of fainting, therapy to address the bradycardia (pacemaker) is indicated before anti-arrhythmic therapy for the tachycardia is prescribed.

Once a diagnosis of SSS is made, treatment recommendations are based upon the severity of the disease and clinical signs. For dogs with significant disease and clinical signs (frequent fainting – some dogs with SSS have been noted to faint over a dozen times per day!), a transvenous pacemaker is recommended. The pacemaker is placed via a minimally invasive surgery by introducing a pacemaker lead through the vein in the neck (jugular vein) and passing it into the right ventricle. A small pacemaker generator is attached to the lead and is placed under the skin in the neck region. Pacemaker therapy is well tolerated in animals and has been shown to improve the length and quality of lives in animals with SSS. Potential complications can include lead fracture, lead migration or development of a blood clot on the pacemaker lead. It is very important that animals are restricted from activity for the first 6 weeks after pacemaker placement. The battery life in modern pacemakers generally lasts for years (with some lasting the life of the patient!).

If signs are infrequent and disease is not severe, or if pacemaker therapy is not feasible, then medical management of SSS can be considered. With this therapy medications are used to increase the heart rate (such as bronchodilators). Unfortunately, this therapy is rarely rewarding in the long term – some patients may have a transient response to medical management for a period of several months before their signs recur.



A thoracic radiograph from a dog with a transvenous pacemaker. Noted the pacemaker lead traveling down the neck into the heart (right ventricle). The lead is attached to a generator that is present under the skin over the neck.

Key Points

Sick sinus syndrome (SSS) is an acquired disease affecting the conduction system of the heart (SA and AV node).

Most common in geriatric dogs – commonly diagnosed in Miniature Schnauzers, Westies and Cocker Spaniels.

Affected animals have signs of weakness, lethargy, exercise intolerance and fainting.

The disease is diagnosed by performing an ECG and may be further supported by a 24-hour ECG called a Holter monitor. An atropine response test is also typically performed.

The best treatment for SSS is transvenous pacemaker therapy which is associated with an improved outcome in dogs with SSS.

Medical therapy is rarely rewarding and may only provide brief benefits in affected animals.