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## Sick Sinus Syndrome

### Issue Description

*Sick sinus syndrome (SSS) is a primary conduction abnormality resulting from sinoatrial node disease. Many dogs and people with SSS also appear to have coexisting dysfunction of the atrioventricular (AV) nodal and intraventricular subsidiary pacemakers, resulting in a failure to generate appropriate escape rhythms. The syndrome so far has been reported in humans and dogs. Canine cases are mostly described in older female miniature schnauzers, dachshunds, cocker spaniels, west highland white terriers and pugs. The inability of the animal to maintain an adequate heart rate, when there is pathological change affecting all pacemakers, contributes to the generation of clinical signs, such as weakness, stumbling, confusion, and syncope.*

### Other Names

*Bradycardia-tachycardia Syndrome, Lazy Sinus Syndrome, Sluggish Sinus Syndrome, Sinoatrial Syncope*

### Causes and Risk Factors

- Idiopathic
- Genetic inheritance, especially in female miniature schnauzers
- Metastatic disease
- Cardiomyopathy characterized by fibrous tissue replacing sinoatrial node tissue
- Ischemic heart disease

### Treatment

- Treatment unnecessary in asymptomatic patients
- Symptomatic dogs can be subdivided into those that show primarily bradycardia or sinus arrest and those that have supraventricular tachycardia followed by sinus arrest.
- Clinical response to medical treatment often inconsistent
- Permanent artificial pacemaker insertion used to treat patients that fail to respond to medical treatment or who cannot tolerate side effects of anticholinergics
- Pacemaker also indicated in animal in which treatment of tachyarrhythmia may aggravate bradyarrhythmia, or vice versa.

### Drugs and Fluids

- Symptomatic dogs with bradycardia or sinus arrest that are atropine responsive are treated with anticholinergic drugs (propranolol [Propranolol]--small dogs, 3.75-7.5 mg PO q8h-q12h; medium dogs, 15 mg PO q8h; large dogs, 30 mg PO q8h)
- Dogs with bradycardia-tachycardia can be given medication to abolish the tachycardia component which may eliminate overdrive suppression resulting in sinus arrest. Digoxin (0.22 mg/m<sup>2</sup> or 0.0055-0.01 mg/kg PO q12h) or propranolol (Inderal, 0.2-1 mg/kg PO q8h) can be administered. Monitor closely for bradycardia.
- Long-acting forms of theophylline (Theo-Dur, 20 mg/kg PO q12h) in dogs with bradycardia and sinus arrest.

### Contraindications/Possible Interactions

- Caution should be taken when treating bradycardia-tachycardia syndrome. The drug treatment for supraventricular tachycardia may worsen the bradycardia/sinus arrest and vice versa. These patients generally require an artificial pacemaker.
- Side effects with anticholinergic drugs are common and include constipation, dry mucous membranes, emesis, and keratoconjunctivitis sicca.

## Follow-Up

- If patient is asymptomatic, monitor with serial ECG for progression
- Owner should watch for development of clinical signs including lethargy, weakness, and syncope.
- If patient is treated medically or by insertion of pacemaker, monitor routinely by ECG.
- In animals that have pacemaker inserted and no signs of CHF, prognosis is good.
- Prognosis varies in animals treated medically; clinical response is often inconsistent and the disease may progress.

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