Sick Sinus Syndrome

**Synonyms:** sinoatrial disease, tachy-brady syndrome

**Definition**

Sick sinus syndrome is a collection of conditions in which the ECG indicates sinus node dysfunction.\(^1\) It is characterised by sinus node dysfunction with an atrial rate inappropriate for normal requirements. Sick sinus syndrome is usually caused by idiopathic fibrosis of the sinus node.

**Aetiology**

Causes include:\(^1\)

- **An intrinsic disease of the sinus node:**
  - Idiopathic degeneration of the sinus node is the most common cause of sick sinus syndrome.
  - Collagen vascular disease: amyloidosis, haemochromatosis, fatty replacement, sarcoidosis.
  - Familial sinoatrial node disorders: autosomal and recessive forms.\(^2\)
  - Friedreich's ataxia, muscular dystrophy.
  - Cardiomyopathies: ischaemia, myocardial infarction, myocarditis, pericarditis, rheumatic heart disease, surgical injury, arteritis.
  - Surgical injury.

- **Extrinsic causes:**
  - Hyperkalaemia, hypoxia, hypothermia, hypothyroidism, hyperthyroidism.
  - Drugs - eg, digoxin, calcium-channel blockers, beta-blockers, sympatholytic agents, anti-arrhythmic drugs.
  - Toxins - eg, result of sepsis.

Sleep apnoea may be a contributing factor by causing reduced cardiac oxygenation. Paediatric causes include congenital abnormalities and sinoatrial nodal artery deficiency.

**Epidemiology**

Sick sinus syndrome is most common in the elderly, but can occur in all ages.

**Presentation**

Abnormalities in sick sinus syndrome include episodes of sinus bradycardia, sinus arrest or exit block, combinations of sinoatrial and atrioventricular nodal conduction disturbances, and atrial tachyarrhythmias.

- At least 50% of people with sick sinus syndrome develop alternating bradycardia and tachycardia, also known as tachy-brady syndrome.\(^3\)
- Patients are often asymptomatic, or have subtle or nonspecific symptoms, such as fatigue.
- Presentation may be with fatigue, dizziness, palpitations, and syncope or presyncope.\(^4\)
- Central nervous system: dementia, irritability, lethargy, light-headedness, confusion, memory loss, nocturnal wakefulness, syncope.
- Cardiovascular system: angina, arterial thromboemboli, cerebrovascular accident, congestive heart failure (dyspnoea), palpitations.
- Other: digestive disturbances, dizziness, errors in judgment, facial flushing, fatigue, oliguria.
- Symptoms associated with sick sinus syndrome may be aggravated by digoxin, verapamil, beta-blockers, sympatholytic agents such as clonidine and methyldopa, and anti-arrhythmic agents.

**Investigations**

- Blood tests include renal function, electrolytes, TFTs and drug levels (eg, digoxin).
- **ECG:** arrhythmias associated with sick sinus syndrome include:
  - Atrial bradyarrhythmias: sinus bradycardia, sinus arrest (with or without junctional escape), sinoatrial exit block (Mobitz type I or Mobitz type II block), ectopic atrial bradycardia, atrial fibrillation with slow ventricular response greater than three-second pause following carotid massage, long pause following cardioversion of atrial tachyarrhythmias.
  - Atrial tachyarrhythmias: atrial fibrillation, atrial flutter, atrial tachycardia, paroxysmal supraventricular tachycardia.
  - Ventricular (escape) tachyarrhythmia.
  - Alternating bradycardias and tachycardias: tachy-brady syndrome.

- Ambulatory ECG to associate arrhythmias with symptoms.
Echocardiogram: associated structural and functional heart abnormalities.

Management

- The treatment of choice for symptomatic bradyarrhythmias in patients with sick sinus syndrome is the placement of a pacemaker.[6, 6]
- Atrial or dual-chamber pacemakers usually provide effective relief of symptoms and lower the incidence of atrial fibrillation, thromboembolic events, heart failure and mortality, when compared with ventricular pacemakers.[7]
- Beta-blockers, quinidine and digoxin may be used in conjunction with a pacemaker for tachyarrhythmias.
- Anticoagulation will be needed for patients with atrial fibrillation.[8]

Complications

- Patients with sick sinus syndrome who have tachy-brady syndrome or chronic atrial fibrillation are at risk for embolic cerebrovascular event.
- Myocardial infarction or sudden cardiac death.
- Congestive heart failure.

Further reading & references

- ECG Library
- Guidelines on Diagnosis and Management of Syncope: European Society of Cardiology (2009)
- Guidelines on cardiac pacing and cardiac resynchronization therapy; European Society of Cardiology (2013)
- Dual-chamber pacemakers for symptomatic bradycardia due to sick sinus syndrome without atrioventricular block (part review of technology appraisal guidance 88); NICE Technology Appraisal, Nov 2014

2. Sick Sinus Syndrome T, Autosomal Recessive, SSS1; Online Mendelian Inheritance in Man (OMIM)
6. Dual-chamber pacemakers for the treatment of symptomatic bradycardia due to sick sinus syndrome and/or atrioventricular block; NICE Technology Appraisal Guidance, February 2005
8. Anticoagulation - oral; NICE CKS (May 2013)

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