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SICK SINUS SYNDROME

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Sick sinus syndrome is malfunction in sinoatrial node characterized by persistent spontaneous sinus bradycardia, alternating sinus bradycardia and tachyarrhythmia (sometimes called tachycardia-bradycardia syndrome). The sinoatrial node (SAN) is the primary pacemaker of the heart. SAN automaticity is responsible for initiating the heart rhythm. So, the SAN function is essential for normal cardiac physiology. Sick sinus syndrome is the inability of the heart's natural pacemaker (sinus node) to create a heart rate that's appropriate for the body's needs. According to literature data, sick sinus syndrome occurs in about 1 in every 600 people with cardiovascular disease older than 65 and accounts for one-half of pacemaker implantations.

Most cases of the sick sinus syndrome are idiopathic, and the cause can be multifactorial. Degenerative fibrosis of the sinoatrial node or atrial fibrosis is the most common cause of sick sinus syndrome. This fibrosis results in two distinct processes: failure of intrinsic automaticity, and failure of sinus node impulses to propagate to surrounding atrial tissue properly (sinus node exit block). This results in bradycardia. The other possible causes of sick sinus syndrome include sarcoidosis, amyloidosis, hemochromatosis, Chagas disease, cardiomyopathies and others.

Extrinsic causes of sinus node dysfunction are cholinesterase deficiency, hyperkalemia, hypoxia, pharmacologic agents such as beta blocker, antiarrhythmics, calcium channel blockers and some toxins. Also, it can be congenital in case of mutation of SCN5A gene encoding alpha subunit of sodium ion channel.

The syndrome presents in a combination of episodic sinus bradycardia or tachycardia, and in severe case may cause sinus pause, sinus block or sinus arrest. Patients frequently have signs and symptoms such as chest pain, fatigue, palpitation, syncope and dyspnea in exertion. In addition, patients may also have recurrent supraventricular tachydysrhythmias such as atrial fibrillation, atrial flutter; "tachy-brady" syndrome may also be seen.

Diagnosis is usually clinical by ECG, Holter monitoring, Tilt table testing. Most patients with ECG are asymptomatic and rarely may have symptoms. Symptomatic patients usually are between ages of 60 and 80 years and suffer from comorbid conditions. Since the symptoms of SAN dysfunction are non-specific, and the initial ECG may not be diagnostic, establishing a correlation between symptoms and the underlying heart rhythm at the time of symptoms is essential for the diagnosis. SAN dysfunction is distinguished from 'physiological' bradycardia, neurocardiogenic syncope with a pronounced cardioinhibitory component, or carotid sinus hypersensitivity. Also, electrophysiological studies of sinus node recovery time, sinoatrial conduction time are done.

Most common treatment plan for a symptomatic bradyarrhythmia in patients with sick sinus syndrome is the placement of a permanent pacemaker. It is a small battery-powered device, surgically placed under the skin of the chest, that takes the function of SA node. Pacemakers use electrical pulses to prompt the heart to beat at a normal rate. An atrial-based pacemaker is recommended in patients with chronic atrial fibrillation with a blood-thinning medicine, such as warfarin (Coumadin, Jantoven), dabigatran (Pradaxa) or other similar medications due to risk of stroke.

Other treatments such as atrioventricular node ablation eliminate the rapid and irregular heartbeats in patients. During this procedure, a catheter is inserted into a vein in the area of the groin and guided up to the atrioventricular node. Radiofrequency energy is passed through the catheter to destroy the node. Cardiac ablation is also used to treat the syndrome, during this procedure a catheter is guided to the area of heart tissue that is producing abnormal electrical signals. Then the catheter emits a pulse of painless radiofrequency energy that destroys the abnormal tissue. This can be done with heat (radio waves, called radiofrequency ablation) or cooling (called cryotherapy or cryoablation).