



Preponderance of Factors Responsible For Sick Sinus Syndrome – Study Of 17 Cases In Tripura

KEYWORDS

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ABSTRACT In our study 17 cases of sick sinus syndrome are reported who required permanent pacemaker implantation. Their presentation varied from severe sinus bradycardia, sinus node arrest to tachy-brady syndrome, atrial flutter, atrial fibrillation. The commonest presenting feature was syncope. The commonest aetiological factor being ischaemic heart disease the others were thyrotoxicosis, thyrotoxicosis with ischaemic heart disease, drugs, viral cardiomyopathy and unknown causes. The second common factor responsible for sick sinus syndrome was unknown factors for identification of which further studies and evaluation are warranted.

Introduction :

The "SICK SINUS SYNDROME" (SSS) is an eponym referring to a constellation of signs, symptoms, and electrocardiographic criteria defining sinus node dysfunction in a clinical setting. Classically, the sick sinus patient presents with symptoms of cerebral dysfunction in association with sinus bradycardia, sinus arrest, SA block and/or alternating brady- and tachyarrhythmias¹

Normal sinus node function is dependent upon a complex and delicately balanced interaction between intrinsic sinus node electrophysiologic properties, sinoatrial conduction properties, and factors outside the sinoatrial region.²

Ischaemic heart disease being the top of the list of aetiological factors others include thyroid abnormalities, metabolic abnormalities, subarachnoid haemorrhage, cardiomyopathies, myocarditis, drugs, toxins etc.⁴

Our study is to find out the preponderance of different risk factors and aetiologies responsible for sick sinus syndrome in this part of the country.

Materials and methods:

The Electrocardiograms(ECG) of the patients seen at department of Medicine of TMC & Dr BRAM Teaching Hospital with symptoms suggestive of Sick Sinus Syndrome (SSS) Over a period of almost four and half years from May 2011 to January 2016 were evaluated.

Patients with Acute Myocardial Infarction monitored were excluded as SSS was mostly transient in them and SSS of congenital or hereditary predisposition also were excluded from the study. Patients admitted with syncope who re-

quired emergency pacemaker implantation were investigated for identification of predisposing factors. The serial ECGs which were taken on follow up visits were analysed. The results of exercise stress test, 24hrs Holter Monitoring, response to intravenous Atropine and other sympathomimetic agents and results of Angiography were analysed.

ECG criteria for diagnosis of SSS included one or more of the following features:

- 1 Sinus bradycardia as per age
< 100 beats per minute – infant
< 80 beats per minute – preschool children
< 60 beats per minute – school going children
< 50 beats per minute – adolescent
- 2 Sinus pause or absence of an expected P Wave for more than 3 secs.
- 3 Marked sinus arrhythmia with constant variation in P-P interval which is likely to be accompanied by sinus bradycardia.
- 4 Presence of both brady and tachycardia i.e. Sinus Node re-entry tachycardia, atrial tachycardia from an ectopic focus, atrial flutter and atrial fibrillation.
- 5 Descriptive data as percentage, mean etc. were used for statistical analysis.

Results:

There were 17 patients in the series comprising 11 male and 6 female. The slightly higher incidence in male is probably due to higher incidence of ischaemic heart disease (IHD) in males.

The peak incidence fell on the age group of 61 to 70 years which might be due to higher incidence of IHD and fibrotic changes in heart in this age group.

Table 1 summarises the aetiology, clinical features, laboratory data, principle rhythm and prognosis of the 17 cases of SSS studied.

Table 1: Summary of aetiology, clinical features, laboratory data, principle rhythm and prognosis.

Aetiology	Case no.	Sex/ Age(yrs)	Pulse rate(BPM)	Principle rhythm	Syncope	Diabetes Mellitus	Dyslipidemia	Cardiomegaly on chest x ray	Pacemaker therapy	Survival till date
Ischaemic heart disease	2	M/62	30-50	Sinus bradycardia with SABlock	+	+	+	+	Implanted	Alive-4yrs, 2months
	3	F/67	28-48	Do	+	-	+	-	Implanted	Alive-4yrs 1 months
	13	F/68	40	Sinus bradycardia	+	-	+	+	Implanted	Alive -2yrs 6 months
	14	M/65	48	Nodal bradycardia with SA arrest	+	+	+	-		Alive -2 yrs 4 months
	15	F/67	54	Sinus bradycardia with SA block	+	+	+	+		Alive -2 yrs 1 month
	16	M/65	50	Wandering pacemaker	+	+	+	-		Alive -1yr 2 months

Thyrotoxicosis	1	F/55	30-50	Mixed bradycardia and tachycardia	-	-	-	+	Implanted	Alive-4yrs 7 months
IHD plus thyrotoxicosis	17	F/65	Unstable	Paroxysmal atrial fibrillation	-	-	-	+	Implanted	Alive - 7 months
Drug (Digixin)	12	M/86	Unstable	Wandering pacemaker with paroxysmal AF	-	-	-	+	Implanted	Dead
Cerebrovascular accident	11	M/74	100	Wandering pacemaker	-	+	-	+	Not done	Dead
	9	F/79	78	Wandering pacemaker	-	-	-	-	Not done	Dead
Viral cardiomyopathy	6	F/58	38-55	Nodal bradycardia	+	-	-	-	Implanted	Alive- 3 yrs 5 months
	8	M/16	40-50	Nodal bradycardia	+	-	-	+	Implanted	Alive-4yrs 4 months
Unknown (Idiopathic)	4	M/68	40-50	Nodal bradycardia with wandering pacemaker	+	-	-	+	Implanted	Alive-3yrs 10 months
	5	M/66	35-55	Nodal brdycardia	+	-	-	-	Implanted	Alive-3yrs 6 months
	7	F/61	35-50	Nodal bradycardia with SA arrest	-	-	-	-	Implanted	Alive- 1 yr 9 months
	10	M/58	40-50	Nodal bradycardia	+	-	-	-	Implanted	Alive- 1 yr 2 months

From the table it is seen that IHD is the commonest cause (almost 50% cases) of SSS and the next common cause is idiopathic. Amongst the ischaemic variety those with Diabetes Mellitus and Dyslipidemia were more vulnerable for SSS. In the unknown variety (almost 25% cases) the factors responsible might be due to certain toxins in local food habits which require further studies and evaluation.

It is noteworthy that SSS due to IHD and of unknown origin were mostly bradycardic while those with thyrotoxicosis were tachycardic (paroxysmal/sustained). Most of these patients presented with syncopal attack.

Out of 17 patients 2 of them expired as a result of underlying disease process not as a direct result of SSS.

Response to therapy:

Table 2 shows varied response to drug treatment and pacing.

Table 2: response of bradycardic rhythm to therapy

Case no.	Aetiology	Intra-venous Atropine	Iso-prenaline	Orciprenaline	Cardiac pacing	Post pacing
2,3,13,14,15,16	IHD	+	Nil	Nil	+(dual chamber)	Doing well
17	IHD with Thyrotoxicosis	±	Nil	Nil	+(dual chamber)	Doing well with anti-tachycardic drugs
1	Thyrotoxicosis	Atrio-ventricular dissociation	±	±	+(dual chamber)	Sinus bradycardias
6,8	Viral cardiomyopathy	+	+	+	+(dual chamber)	Doing well
9,11	Cerebrovascular accident	+	+	+	Not done	Dead

4,5,7,10	Un-known	-	-	+	+(dual chamber)	Doing well
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Our patients had therapeutic trials for assessment of various cardiac accelerating agents. The presence of mixed rhythms of bradycardia and tachycardia frequently made it difficult therapeutically as very often drug treatment of arrhythmia will potentiate the other. It was on this dilemma our patients were put on pacemaker therapy preferably dual chamber pacemaker.

Discussion:

The sinoatrial nodal dysfunction may present with a variety of spectrum of arrhythmia and conduction defects. Lown (1967)⁵ first used the term sick sinus syndrome while Ferrar (1968)⁶ reviewed the pathophysiological mechanism and clinical manifestations. Persistent sinus bradycardia is the early sign of sinus node dysfunction.

The sino atrial node has the highest rate of impulse formation which makes it the dominant pacemaker of a normal heart. But the diseases of sino atrial node may lead to transient or permanent failure of the impulse formation leading to a variety of arrhythmias. The diseases may be related to inflammation or infarction or fibrotic changes in the sino atrial node or may be due to autonomic dysfunction. The rhythm in SSS may be classified as bradycardic, tachycardic or mixed. The rhythm may present as alternating bradycardia and tachycardia.⁷ It is also described as bradycardia - tachycardia - asystole syndrome.⁸ Wan SH et al described about various presentation, aetiology and therapeutic responses of SSS among 15 cases where IHD, Thyrotoxicosis were some common causes responsible for SSS.⁹

Our study was to find out the preponderance of various aetiological factors of sick sinus syndrome in Tripura. It appears from this series study that sick sinus syndrome may be caused by varied aetiological factors, mild IHD heading the list and the unknown aetiology being the second most common cause which requires to be given importance for further studies. The other causes were thyrotoxicosis, viral cardiomyopathy etc. The incidence were more in patients with Diabetes Mellitus and Dyslipidemia. Atherosclerotic narrowing of the artery to sinus node leads to circulatory insufficiency and injury to the node ultimately leading to its dysfunction.

The unknown aetiology is another group which is increasing in no. these days. Metabolic causes like electrolyte imbalance, effects of toxins, local food habits these things should be sought for. For identification of the factors responsible for the idiopathic group of sick sinus syndrome further studies are warranted.

Management of SSS is again challenging in view of poor and unpredictable response to sympathomimetic and vagolytic agents. The implantation of pacemaker is life saving for patients. In our study patients responded well with dual chamber pacing and on follow up they are still doing good.

Conclusion:

It appears from this series study that sick sinus syndrome may be caused by varied aetiological factors, mild IHD heading the list and the unknown aetiology being the second most common cause which requires to be given importance for further studies. The possibility of any toxins in local food habits causing sick sinus syndrome should also be considered. The treatment is difficult in view of the diverse manifestations within the same patient from sinoatrial arrest and bradycardic arrhythmia to atrial tachycardia and chaotic atrial rhythms. In view of the unpredictability of response to the sympathomimetic and vagolytic drugs cardiac pacing is more reliable in both the bradycardic and paroxysmal tachycardia groups.

In our study we observed the preponderance of IHD as the commonest aetiological factor of sick sinus syndrome next common being the unknown aetiology. Diabetic and dyslipidemic patients were more vulnerable for development of sick sinus syndrome as it causes atherosclerotic narrowing of arteries leading to necrosis and fibrotic changes in the sinoatrial node. Sinus nodal fibrosis may also be contributing as an idiopathic factor for SSS which requires further evaluation.

Limitations of Study:

The sample size of our study was relatively small. Similar studies with a larger sample size would be desirable for better evaluation.

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