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FREQUENCY OF CORONARY ARTERY DISEASE IN PATIENTS WITH COMPLETE HEART BLOCK REQUIRING IMPLANTATION OF PERMANENT PACEMAKER AT A TERTIARY CARE TEACHING HOSPITAL BASED STUDY

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KEYWORDS :

INTRODUCTION:

Bradyarrhythmias and conduction blocks are a common clinical finding and may be a physiologic reaction (for example in healthy, athletic persons) as well as a pathologic condition. Arbitrarily, bradyarrhythmias are defined as a heart rate below 60 beats per minute (bpm). These can be further categorized on the basis of the level of disturbances in the hierarchy of the normal cardiac conduction system.[1] The two major categories are sinus node dysfunction (SND) and atrioventricular (AV) conduction disturbances or blocks. Clinical presentation of bradyarrhythmias varies from asymptomatic electrocardiographic findings to a broad array of symptoms which most bradycardias have in common. Patients may present with near syncope and/or syncope, symptoms of heart failure such as dyspnea, angina, or premature mental incapacity, but also with nonspecific and chronic symptoms (dizziness, fatigue, lethargy). Symptoms can be either permanent or intermittent and unpredictable, as with SND.

Symptoms of bradyarrhythmias
1. Dizziness, light-headedness, vertigo
2. Pre-syncope, syncope, adam-stokes attacks
3. Fatigue, lethargy
4. Angina, dyspnea
5. Congestive heart failure
6. Mental incapacity

MATERIALS AND METHODS:

A total 100 consecutive high risk patients for having coronary artery disease requiring implantation of permanent pacemaker due to complete heart block or symptomatic sick sinus syndrome or conduction diseases were taken for study.

Inclusion and Exclusion Criteria:
Inclusion Criteria:

The patients of complete heart block or symptomatic sick sinus syndrome or Conduction diseases degenerating into advanced heart blocks above the age of 45 years who are at high risk of having coronary artery disease were involved in the study. Patients were diagnosed as having a particular conduction disease and taken for permanent cardiac pacing as per below mentioned.

1. Sick sinus syndrome
2. Complete heart block
3. 2nd degree heart block
4. Bifasicular, Trifasicular conduction diseases

Exclusion Criteria:
1. Acute illness including acute coronary syndrome.
2. Any predominant non cardiac chronic disease.
3. History of malignant neoplasm.
4. On digoxin or digitoxin, beta-blockers and calcium channel blockers.
5. Severe anemia.
6. Severe caugulopathy.
7. Severe dyselectrolytemia.
8. Allergic to contrast agent
9. Patients older than 80 years and patients with severe co morbid conditions like cerebrovascular accidents or cor-pulmonale.
10. Patient in whom the disorder was related to acute MI or the etiology was congenital.
11. Patients with valvular heart diseases or cardiomyopathy.

Study design: A Prospective hospital based study was conducted among the patients above the age of 45 years requiring permanent pacemaker implantation due to heart blocks / symptomatic sick sinus syndrome or conduction diseases, who are at high risk of having coronary artery disease, diagnosed on 12 lead ECG or 24 hrs Holter monitoring or inputs from invasive electrophysiology.

A detailed history was taken and relevant physical examination was done. All base line investigations including CBC, LFT, KFT, ABG & electrolyets, lipid profile, serum uric acid, blood sugar, serum calcium were done (Annexure 1). ECHO was also done in all cases. Risk calculation was done according to the Framingham coronary heart disease risk score and only patients having high risk were taken for coronary angiography in this study.

Pie chart 1

Distribution as per sex
■ Males ■ Females

47%   53%
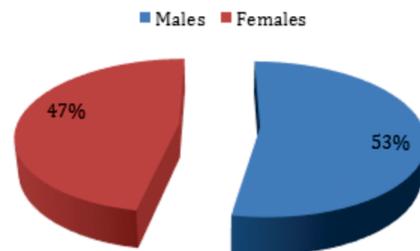
Pie chart showing distribution of patients in our study group as per sex.

Total No. of patients = 100, Males = 53, Females = 47

Pie chart 2

CAD:Present/Absent

Absent 55%   Present 45%

Pie chart showing presence and absence of CAD in our study group.

Total No. of patients = 100, CAD present = 45(45%), CAD absent = 55(55%)
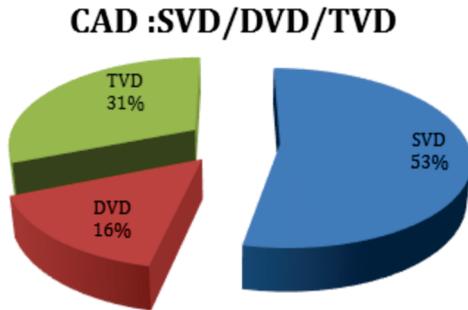
Pie chart 3

CAD : Obstructive/ Non obstructive

Non obstructive 36%   Obstructive 64%

Pie chart showing nature of CAD in patients having CAD on CAG.

Obstructive CAD=in 29 (64%). Non obstructive CAD = in 15 (36%). N=45

Pie chart 4

CAD :SVD/DVD/TVD

Pie chart 3. Pie chart showing no of vessels involved on CAG in patients having CAD. SVD=24 (53%). DVD=7(16%). TVD=14 (31%). N=45

Pie chart 5

Indication of PPM implantation
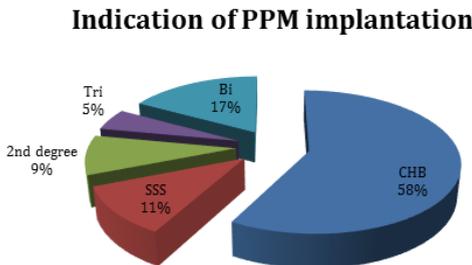
Pie chart showing indication of PPM implantation of 100 patients in our study group. CHB=58 (58%). SSS=11(11%). 2nd degree heart block=9 (9%). Trifascicular block=5 (5%). Bifascicular block=17 (17%).

Table 1

Indication (ECG)	Frequency	Percentage (%)
CHB	58	58
Sick sinus Syndrome	11	11
2nd degree heart block	9	9
Trifascicular block	5	5
Bifascicular block	17	17
Total	100	100

Table showing total number of patients in our study group with ECG finding /indication of PPM implantation. N=100

Table 2

Age group	Coronary artery disease		Total
	Absent	Present	
45- 50	3 5.5 %	4 8.9 %	7 7.0 %
50 – 60	11 20.0 %	12 26.7 %	23 23.0 %
60 – 70	20 36.4 %	14 31.1 %	34 34.0 %
70 – 80	21 38.2 %	15 33.3 %	36 36.0 %
Total	55	45	100
Mean ± SD	64.3 ± 11.0	66.8 ± 9.0	64.6 ± 10.7

Table showing patients in various age groups and presence and absence of coronary artery disease in these sub groups of patients. P value =0.466

Table 3

Sex	Coronary artery disease		Total
	Absent	Present	
Female	25	22	47
	45.5%	48.9%	47.0%
Male	30	23	53
	54.5%	51.1%	53.0%
Total	55	45	100

Table showing distribution of patients in our study as per sex and status of Coronary artery disease in them. P value=0.732

Table 4

Risk factors	Coronary artery disease				P value
	CAD present (45)	Percentage (%)	CAD absent (55)	Percentage (%)	
HTN	41	88	47	85.5	0.387
T2DM	10	22.2	15	27.3	0.562
H/O CAD	8	17.8	4	7.3	0.108
Obesity	3	6.7	3	5.5	1.000
Smoking	23	51.1	16	29.1	0.025
Dyslipidemia	19	42.2	13	23.6	0.047
Family history	7	15.6	23	41.8	0.004

Table showing distribution of patients in both groups (CAD present and CAD absent) as per risk factors and P value of each risk factor in both groups of patients (total patients=100)

Table 5

ECG finding	Coronary artery disease		Total
	Absent	Present	
CHB	29 52.7 %	29 64.4 %	58 58.0 %
Sick sinus syndrome	7 12.7 %	4 8.9 %	11 11.0 %
2nd degree block	4 7.3 %	5 11.1 %	9 9.0 %
Trifascicular block	2 3.6 %	3 6.7 %	5 5.0 %
Bifascicular block	13 23.6 %	4 8.9 %	17 17.0 %
Total	55	45	100

Table showing status of coronary arteries on CAG in all patients divided in different subgroups as per ECG finding/indication of PPM implantation

Table 6

No risk factors	Coronary artery disease		Total
	Absent	Present	
2	36	36	72
	65.5%	80.0%	72.0%
3	15	8	23
	27.3%	17.8%	23.0%
4	4	1	5
	7.3%	2.2%	5.0%
Total	55	45	100

Table showing status of coronary arteries on CAG and number of risk factors present in two groups of patients (CAD present and CAD absent). P value=0.228

DISSCUSSION:

This hospital based study was carried out to find the frequency of coronary artery disease in patients of chronic heart blocks who were candidates for permanent pacemaker implantation. 100 patients having chronic heart blocks who presented to emergency or OPD and admitted in cardiology ward of department of cardiology were taken for study. In all patients Coronary angiography was performed after PPM implantation who were at high risk for having coronary artery disease.

Out of 100 patients studied, 53 (53%) were males and 47 (47%) were females (Pie chart 4) .The patients were in the age group ranging from 45-80 years with a mean age and SD of 64.6 ±10.7 (Table 2). The mean age and SD in patients having coronary artery disease was 64.3 ± 11.0 and mean age and SD in patients in having no coronary artery disease was 66.7 ± 9.0 (Table 2). Out of 100 patients, 45 were documented as having coronary artery disease on coronary angiography (Pie chart 1), which is well within the range of 30-70% reported in the literature. This large range was attributed to several factors like patient characteristics, specific type of conduction defect evaluated and most important factor which is the way to detect coronary artery disease. As a gold standard for detection for coronary artery disease, coronary angiography was used in our study in all patients. So it is rational that our results are as close as possible to the real frequency of coronary artery disease in patients with chronic conduction defects.

Out of 100 patients in our study, CHB was present in 58 patients (58%), 11 patients had sick sinus syndrome (11%), 2nd degree heart block was present in 9 patients (9%), trifascicular block was present in 5 patients

(5%), bifascicular block was present in 17 patients (17%). (Pie chart 3, Table 1).

Out of 100 patients in our study, coronary artery disease was present in (Pie chart 1) 45 patients (45%). Out of 100, 47 patients (47%) were females and 53 (53%) were males (Pie chart 4). Out of 47 females patients coronary artery disease was present in 22 patients (46.80%) and out of 53 male patients coronary artery disease was present in 23 patients (43.39%). Although female patients had more chance of having coronary artery disease in our study group than their male counterparts, but this difference was statistically insignificant (P value=0.732). Table 3

As far as age group was concerned, coronary artery disease was present in 4 patients in age group of 40-50 (Total patients in this age group were 7), 12 patients in the age group of 50-60 (Total patients in this age group were 23), 14 patients in the age group of 60-70 (Total patients in this age group were 34), 11 patients in the age group of 70-80 (Total patients in this age group were 36). So maximum no of patients in our study were in age group of 70-80. Although frequency of finding coronary artery disease was increasing with increasing age in our patients but this association was statistically insignificant (P value=0.466). Table 2

Out of 45 patients in whom coronary artery disease was present (Pie chart 2), 29 (64.44%) had obstructive coronary artery disease (stenosis greater than or equal to 50% in at least one major coronary artery branch) and 16 (35.55%) had non-obstructive coronary artery disease on coronary angiography (stenosis less than 50 percent). Out of 22 female patients who had coronary artery disease, 12 (54.55%) had obstructive coronary artery disease and 9 (46.45%) had non - obstructive coronary artery disease. Out of 23 male patients who had coronary artery disease, 17 (73.91%) had obstructive coronary artery disease and 6 (26.09%) had non -obstructive coronary artery disease (Table 3). So it can be concluded from above data that male patients who had coronary artery disease, had more chances of having obstructive coronary artery disease as compared to female patients who had coronary artery disease. Although this difference was statistically insignificant (P value=0.173).

As far as presenting complaints were concerned, patients had presented with main complaints of syncope, pre syncope, chest pain, DOE and palpitations. In patients which had coronary artery disease on coronary angiography, syncope as a complaint was present in 33 and in patients who don't had coronary artery disease syncope as a complaint was present in 37 with a P value of 0.511. Pre syncope was present in 12 patients in the group who had coronary artery disease and it was present as a complaint in 17 patients out of 55 who did not had coronary artery disease on coronary angiography with a P value of 0.642. Similarly DOE as a complaint was present in 10 patients out of 45 who had coronary artery disease and it was present in 8 patients out of 55 patients in whom coronary artery disease was absent on coronary angiography. Chest pain as a presenting complaint was present in 15 patients in the group of patients who had coronary artery disease and it was present in 10 patients in whom coronary artery disease was absent with a P value of 0.320. Palpitations as complaint was present in 4 patients in each group with P value of 1.000. Thus although chest pain as a complaint was present higher percentage of patients in the group who ultimately had coronary artery disease as compared to group in whom coronary artery disease was absent, but the difference was statistically insignificant (0.082). Table 9

In the end it seems frequency of coronary artery disease in these patients who are candidates for PPM implantation and are at high risk for having coronary artery disease is high enough to be assessed by coronary angiography. It can also be safely assumed from this study that in those patients having chronic conduction defects, coronary artery disease induced ischemia may be responsible for their rhythm disturbances and in addition to implantation of permanent pacemakers other therapies like coronary revascularization or optimization of medical therapy should be considered for better management.

CONCLUSION:
In a population of 100 consecutive patients with newly implanted permanent pacemaker, who subsequently had coronary angiography due to high risk profile for coronary artery disease, the frequency of coronary involvement was 45% (total patients=100). Out of these 45 patients (N=45), 29 (64.44%) had obstructive coronary artery disease

and 16 (35.56%) had non obstructive coronary artery disease.

The most frequent symptom of this patient population is syncope/pre syncope (present in 100%) and angina and angina equivalent was present in 25% and 18% patients respectively. Since their main symptom at presentation is pre syncope/ syncope and their other cardiac symptoms are either ignored or not taken into consideration and their coronary artery disease remains undiagnosed, which can have detrimental effect on the morbidity and mortality.

Thus from the results of this study it can be concluded that in patients with chronic conduction diseases, requiring implantation of permanent pacemaker, coronary angiography may be performed in those who are at high risk of having coronary artery disease. This will not only help in early diagnosis of coronary artery disease in such patients, but will also help in preventing progression of non obstructive coronary artery disease and early management of patients having obstructive coronary artery disease in the form of optimization of medical therapy or revascularization. This study may be the base for further clinical studies with large population to validate our findings.

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