Original Article

Evaluation of Seasonal Variation in Cardiac Conductive Disorders Leading to Permanent Pacemaker Implantation in The North-West Provinces of Iran

F. Akbarzadeh MD,1 N. Malekpour MD,2 H. Akbarzadeh,3 A. Mesbahi3

From Cardiovascular Research Center of Tabriz University of Medical Sciences, Tabriz, Iran.
1. Assistant professor in cardiology, Tabriz University of Medical Sciences
2. General physician, Tabriz University of medical sciences
3. Cardiology nurse, Faculty of Nursing, Sari Azad University
Shahid Madani Heart Center.

Correspondence: Dr F. Akbarzadeh, Assistant professor in Cardiology. E-mail: f_akbarzadeh@yahoo.com
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ABSTRACT

Objective: To evaluate seasonal variation in cardiac conductive disorders leading to permanent pacemaker (PPM) implantation.

Patients and Methods: Conductive disorders of all patients who had implanted cardiac pacemakers during years 2005-2006 were evaluated. All conduction disorders in atrial and atrioventricular node were included. Statistical analysis was done by SPSS version 13.

Results: 341 patients, 197 males and 144 females with mean age of 64.9±12 and 69.5±14 years were included in the study. Incidence of conductive disorders (CD) was significantly lower in summer and autumn with 154 (45.2%) episodes than winter and spring with 187 (54.8%) episodes (P=0.007). High incidence of CD in winter and spring was seen more often in females.

Conclusion: Incidence of CD which leads to PPM implantation was higher in winter and spring than other seasons. Lower incidence in males with CD in these seasons may implicate etiologies other than infectious disease. (Rawal Med J 2008;33:47-49).

Key words: Conductive disorders, pacemakers, seasonal.

INTRODUCTION

Most of physiologic, neurologic and behavioral functions in humans have seasonal variations.1-4 In the field of cardiovascular disorders there are some seasonal patterns like seasonal variation in mortality and morbidity of acute myocardial infarction and seasonal variation of congestive heart failure.5,6 In spite of seasonal variation in some of cardiovascular disorders, there are limited studies which evaluated the seasonal variation in conduction disorders of heart which lead to pacemaker implantation. Seasonal variations in conduction disorders may be due to infectious disease like viral disease which have seasonal incidence. The best and some times the only therapy for treatment of conductive disorders is pacemaker (PPM) implantation.7 This study evaluated the seasonal variation in conductive disorders which lead to PPM implantation.
MATERIALS AND METHODS
In this descriptive cross-sectional study, all patients who had PPM implanted during years 2005 and 2006 in Shahid Madani Heart Center were included. Patients with trichamber pacemakers and implantable cardiac defibrillators were excluded from study. Demographic data, type of conductive disorders, month of implantation, rhythm of patients, type of pacemaker and other characteristics were collected. The surface electrocardiogram (ECG) was the bases for diagnosis of conductive disorders and patients were divided in to three groups: 1. Sinus node diseases included sick sinus syndrome, sinus bradycardia and sinus arrest, 2. Atrioventricular node disease included all types of AV blocks and 3. Atrial fibrillation with very low ventricular response. Two types of pacemakers were implanted: 1. Single chamber pacemakers including VVI and VVIR PPMs, and 2. Dual chamber pacemakers including DDD, DDR and VDD PPMs.
Congenital complete heart block (CHB) was defined as existence of CHB on surface ECG in patients younger than 50 years old without any predisposing factors like as ischemic heart disease or cardiomyopathies. Degenerative disease was defined as existence of conductive disorders on surface ECG in patients with age greater than 50 years old without any predisposing factors mentioned in item one.
Data analysis was done by SPSS 11.5 soft ware. Continuous quantitative numeric data were analyzed as mean ± SD. Comparison of continuous numeric data was done by T-test and quantitative data by Chi square analysis. Comparison between groups was done by Mantel-Haenszel analysis. P values less than or equal to 0.05 was considered statistically significant.

RESULTS
During two years 341 patients had PPM implanted and included, 197 males with age 65 ±12 and 144 female with age 70 ± 14 years.
Various types of conductive disorders were as follows: CHB (56%), Mobitz type II (13%), Wenkebach’s AV block (13%), grade I AV block with hemodynamic instability (2%), sick sinus syndrome (17%), severe sinus bradycardia (2.6%) and sinus arrest (6%). Etiology of conductive disorders were considered as degenerative in 84%, congenital in 3%, after cardiac surgery in 7% and after myocardial infarction in 6% of patients. 47% of our patients had bundle branch block morphology on their surface ECG. Table 1 shows some data on conductive disorders and type of pacemakers implanted.

Table 1. Types of conductive disorders and pacemakers in patients.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Male No. (%)</th>
<th>Female No. (%)</th>
<th>Total No. (%)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductive disorders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AVN disease</td>
<td>130 (60)</td>
<td>88 (40)</td>
<td>218 (64)</td>
<td>0.35</td>
</tr>
<tr>
<td>SN disease</td>
<td>49 (55)</td>
<td>30 (45)</td>
<td>88 (26)</td>
<td>0.38</td>
</tr>
<tr>
<td>AF with low VR</td>
<td>18 (51)</td>
<td>17 (49)</td>
<td>35 (10)</td>
<td>0.4</td>
</tr>
<tr>
<td>PPM types</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single chamber</td>
<td>77 (56)</td>
<td>61 (44)</td>
<td>138 (40)</td>
<td>0.6</td>
</tr>
<tr>
<td>Dual chamber</td>
<td>120 (59)</td>
<td>83 (41)</td>
<td>203 (60)</td>
<td>0.6</td>
</tr>
<tr>
<td>Total</td>
<td>197 (58)</td>
<td>144 (42)</td>
<td>341 (100)</td>
<td>0.003</td>
</tr>
</tbody>
</table>
Types of pacemakers implanted were as follows: VVI in 12.6%, VVIR in 27.8%, VDD in 12.3%, VDDR in 12.6% and DDDR in 34.6% of patients. Comparing the monthly occurrence of conductive disorders showed lower incidence these disorders from June to November. 45% of conductive disorders occurred during these 6 months which was significantly lower than other months of year (P=0.007) (fig.1). In subgroups of conductive disorders (AVN and SN disease groups), the differences were significant also, 44.5% vs 55.5% (P=0.02), 38.7% vs 61.3% (P=0.002) respectively.

Male to female ratio in total population of our patients were 58%/42% which changed to 65%/35% in months June to November and to 52%/48% in other months of year. (P=0.01).

**DISCUSSION**

Incidence of conductive disorders leading to PPM implantation was higher in spring and winter. This finding is partly compatible with a study from Taiwan 2003 which showed increase in the incidence of conductive disorders from October to December.2 They speculated that decrease in temperature and increase in incidence of viral infections and myocarditis may relate to this increase in incidence. Viral infections and myocarditis have been showed as possible cause of conductive disorders from sinus node to A-V node in some studies.8,9 Although Enterovirus is the major cause of myocarditis, other viruses like Herpes Simplex and Coxsackie B2 virus can cause myocarditis and conductive disorders.10 Some of these viruses can cause reversible infra His block.11 Incidence of viral infections and myocarditis increases in cold months of the year and virus infections have been demonstrated to occur predominantly in the winter season in Asia.2 Some studies reported higher incidence of viral infections in men than women.12 In our study, incidence of conductive disorders increased during winter and spring. North-West provinces of Iran have cold mountain climate and most of cold months are there in winter and spring. In subgroup analysis of study, increase in incidence of conductive disorders was related to increase in women population, among the male population the incidence actually decreased. So the increase in incidence of conductive disorders in women and in total population probably is not related to increase in the incidence of viral infections and myocarditis. Because of homogeny of demographic characteristics of men and women other unknown factors may be responsible for this seasonal difference. The influences of festivals or physician vacations on the discrepancy were minimal because physician vacations are usually
less than 2 weeks in IRAN and in our center there are many physicians for implanting PPMs. All of the indications for pacemaker implantation in our country are strictly based on the ACC/AHA guidelines. Small sample number and two year duration may be limitations of the study. Therefore, large sample size involving many centers in the same geographic regions in needed to verify our results and explore possible etiologic factors.

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