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CAUSES, CLINICAL CHARACTERISTICS AND HOSPITAL OUTCOMES OF PATIENTS WITH HIGH DEGREE AV BLOCKS

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All the authors contributed significantly to the research that resulted in the submitted manuscript.

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ABSTRACT

Objective: To evaluate the causes, symptoms, clinical course and outcome of patients admitted to Cardiology department with high degree AV blocks

Methodology: All patients admitted to Cardiology unit with high degree AV blocks from 1st January 2012 to 31st May 2012 were included in the study. Baseline clinical characteristics, causes, signs and symptoms, management strategies and outcomes were recorded on a pre-designed Performa. Statistical analysis was done using SPSS version 19.

Results: A total of 127 patients were included in the study. Males were 55(43.3%) and 72(56.7%) were females mean age was 65 ±13.73 years and mean heart rate at presentation was 36±4.32 were (95(74.81%) patients having aged more than 50 years). Total 83(65.35%) were hypertensive and 55(43.30%) were diabetics. The causes found were coronary artery disease in 43(33.9%), beta blockers in 32(25.19%), rate limiting calcium channel blockers in 8(6.9%), digoxin in 3(2.3%), Hyperkalemia (K+>5.5 mq/l) in 11 (8.66%), deranged urea (>50 mg/dl) in 45(35.43%), Increased creatinine in 26(20.46%) patients. While no cause was found in 69(54.33%) patients. The symptoms including dizziness/vertigo found in 102 (80.31%), Presyncopae in 95(74.80%), syncope in 64(50.39%), fits in 5(3.93%) and dyspnea in 45(35.43%). Among them 22 (17.32%) patients responded to Atropine. were 105(82.68%) patients required TPM (Temporary Pacemaker). Of these 105 patients, 43 patients required permanent pacemaker (PPM). patients died were 4(3.1%)

Conclusion: Most patients were aged more than 50 years, The common causes of block were ischemic and degenerative heart diseases. Presenting symptoms were vertigo, dizziness, presyncope, syncopal attacks and dyspnea. A quarter of patients responded to atropine, of remaining half required permanent pacemaker.

Key Words: High Degree AV blocks, atropine, temporary pacemakers, permanent pacemaker

INTRODUCTION

Worldwide, the prevalence of third-degree AV block is 0.04%.[1] In complete heart block, the site of conduction dysfunction is most commonly below the His bundle in the Purkinje system (60%). It is less commonly found in the AV node (21%) or the His bundle (14-18%).[2] The presence of a narrow QRS complex suggests the site of the delay is more likely to be in the AV Node; however, a wide QRS complex may be observed with either AV Node or infranodal conduction delay.[3] There are different causes of heart block like different cardio-active drugs are an important cause of AV block.[4-6] Persistent second-degree AV block following adenosine infusion for nuclear stress testing has been reported.[7] Benzathine penicillin has been associated with second-degree AV block.[8] Inflammatory diseases , endocarditis, myocarditis, lyme disease, acute rheumatic fever[9], infiltrative diseases , amyloidosis, hemochromatosis, sarcoidosis (AV conduction abnormalities can be the first sign of sarcoidosis[10], infiltrative malignancies, such as hodgkin lymphoma and other lymphomas, and multiple myeloma[11], metabolic and endocrine disorders – hyperkalemia, hypermagnesemia, addison disease, hyperthyroidism, myxedema, thyrotoxic periodic paralysis[12], collagen vascular diseases ,ankylosing spondylitis, dermatomyositis, rheumatoid arthritis, scleroderma, lupus erythematosus, reiter syndrome, mixed connective tissue disease[13], myocardial bridging[14] , transcatheter closure of atrial and ventricular septal defects[15,16] obstructive sleep apnea.[17] Degenerative changes in the AV Node or bundle branches (eg, fibrosis, calcification, or infiltration) are the most common cause of nonischemic AV block. Coronary artery disease is associated with higher degree AV blocks which is more frequent in inferior wall MI. Second-degree AV block usually is asymptomatic. However, in some patients, sensed irregularities of the heartbeat, presyncope, or syncope may occur. The latter usually is observed in more advanced conduction disturbances, such as Mobitz II second-degree AV block. A history of medications that affect atrioventricular node (AVN) function (eg, digitalis, beta-blockers, and calcium channel blockers) may be contributory and should be obtained.

Third-degree AV block frequently is associated with symptoms such as fatigue, dizziness, lightheadedness, presyncope, and syncope most commonly. Syncopal episodes due to slow heart rates are called Morgagni-Adams-Stokes (MAS) episodes, in recognition of the pioneering work of these researchers on syncope. Patients with third-degree AV block may have associated symptoms of acute myocardial infarction either causing the block or related to reduced cardiac output from bradycardia in the setting of advanced atherosclerotic coronary artery disease.

The aim of this study was to know the frequency of advanced second degree and 3rd degree AV block (CHB), causes and in hospital outcome.

METHODOLOGY

All patients admitted to cardiology unit from first January 2012 to 31st may 2012 were evaluated for advanced 2nd degree and 3rd degree Av block. Only patient with advanced 2nd degree or third degree AV bock of any cause were included in the study. 12 lead ECG was used as a diagnostic tool for high degree AV block in our study. The sampling technique was non-probability consecutive. The patients excluded were of first degree or mobitz type 2nd degree, sinus bradycardia, junctinal bradycardia. All the data was collected on specially designed performa and entered to computer. Advanced second degree AV block was defined as, in which two or more consecutive P waves are non-conducted while Third-degree AV block (also called complete heart block)was defined when more P waves than the QRS complexes were present and no relationship existed between them (no conduction).If the patient was taking any drugs that might cause high degree AV block ,it was immediately stopped. Data was entered and analyzed using SPSS version 19. Frequencies and percentages were calculated for all qualitative variables like Gender, coronary artery disease, Thyroid etc. Mean, standard deviation was calculated for quantitative variables like age and duration of symptoms. Chi-square test will be applied to check association between qualitative variables.

RESULTS

A total of 127 patients were included in the study. Of these 55(43.3%) were male and 72(56.7) were females. Mean age was 65±13.73 years. Mean heart rate at presentation was 36±4.32. 32(25.19%) patients were less than 50 years while 95(74.81%) patients were having age more than 50 years among these patients,83(65.35%)were hypertensive, 55(43.30%) were diabetics, 20(15.74%) were smokers and 14(11.02%) were hyperlipidemiac. The causes of complete heart block in our studied population were coronary artery disease in 43(33.9%), beta blockers use were found as the causal factor in 32(25.19%), rate limiting calcium channel blockers in 8(6.9%),digoxin in 3(2.3%).(Table 1) hyperkalemia (K+>5.5 mq/l) was found in 11 (8.66%),deranged urea (>50 mg/dl) was found in 45(35.43%),deranged creatinine were found in 26(20.46%) patients. In some patients more than one cause was found. None of the patient was having thyroid disease, myopericarditis or having connective tissue disorder found. While no cause was found in 69(54.33%) which was attributed to age related degeneration. The mean duration of symptoms was 7 ±2 days. The symptoms were dizziness/vertigo were found in 102 (80.31%), syncope in

Table 1: Baseline Characteristics

Variables	N (%)
Inferior wall MI	32(25.2)
Anterior wall MI	5(3.9)
Posterior wall MI	7(5.5)
Lateral wall MI	8(6.3)
Thyroid Disease	0(0.0)
Coronary Artery Disease	43(33.9)
Duration of Symptoms	7 days
Hypertension	83(65.35)
Diabetes	39(65.35)
Hyperlipidemia	14(11.02)
Smoking	20(15.74)
Beta Blocker	32(25.19)
Calcium Channel Blocker	8(6.29)
Digoxin	3(2.3%)

Table 2: Signs/Symptoms at Presentations

Symptoms	Frequncy
Dizziness / Vertigo	102 (80.31)
Presyncope	95 (74.80)
Syncope	64 (50.39%)
Dysopnea	45 (35.43%)
Fits	5(3.93%)

64(50.39%), Presyncope in 95(74.80%), fits in 5(3.93%) and shortness of breath in 45(35.43%) (Table 2). Almost all of the patients were given atropine while only 22 (17.32%) responded i.e. reverted to normal sinus rhythm with hear rate of $\geqslant$ 60/min. All the rest of the patients 105(82.68%) have TPM (Temporary Pacemaker) passed (Table 3). Of these 105 patients 20(19.04%) required TPM for less than 24 hours, 28 (26.66%) for 24 to 72 hours, 14 (13.33%) for more than 72 hours. The rest of 43 patients required permanent pacemaker (PPM). Four (3.1%) patients died.

DISCUSSION

We most often come across various patients presented to us in cardiology department with high degree AV blocks. This study was performed to know about the various causes of high degree heart blocks, symptoms at presentation, various treatment options and clinical outcome in our local population. Our study population includes more Females i.e. 72(56.7%) Vs 55(43.3%) males. Majority of patients were hypertensive i.e. 83(65.35%). Of them 55(43.30%) were diabetics. Most of the patients in our study were having age more than 50 years i.e. 95(74.81%).Almost all of the studies shows that most of the patients with high degree AV blocks are elderly. There are reports[18-20]in the literature about increased prevalence of cardiac conduction abnormalities and autonomic neuropathy in patients with DM. In several case reports and small studies,[21-23] third-degree atrioventricular (AV) block is reported in patients with DM. The low heart rate observed in third-degree or Mobitz II second-degree AV block may lead to syncopal episodes with major injuries (e.g. head trauma, hip fracture),

Table 3: Labs at Presentation

Investigations	No (%)
Blood Urea Level	
10-40 mg / dl	82(64.56)
> 40 mg / dl	45 (35.43)
Serum Creatinine	
0.5 to 1.5 mg / dl	101 (79.52)
> 1.5 mg / dl	26 (20.47)
Hyperkalemia (K > 5.5 meq /l)	11 (8.66)

exacerbation of congestive heart failure, or exacerbation of ischemic heart disease symptoms due to low cardiac output. Third-degree AV block is associated with profound bradycardia unless the site of the block is located in the proximal portion of the AVN. Laboratory testing is not usually indicated in patients with atrioventricular (AV) block. levels of electrolytes and drugs (eg, digitalis) can be checked in the case of higher degree AV block when suspicion of increased potassium level or drug toxicity exists. In cases when second-degree and third-degree AV block might be a manifestation of acute myocardial infarction, cardiac enzymes should be measured. If clinical evaluation suggests systemic illness, appropriate directed laboratory studies for infection, myxedema, or connective tissue disease should be performed.

Routine electrocardiographic (ECG) recording and cardiac monitoring with careful evaluation of the relationship between P waves and QRS complexes are the standard tests leading to proper diagnosis of AV blocks. Long-term medical therapy is not indicated in atrioventricular (AV) block. Permanent pacing is the therapy of choice in advanced AV block, and it does not require concomitant medical therapy. AV nodal blocking medications contributing to heart block should be discontinued if not necessary. Complications include Sudden death due to asystole or secondary to polymorphic ventricular tachyarrhythmias, Cardiovascular collapse with syncope,Head and musculoskeletal injuries during syncopal episodes.

Temporary transcutaneous or transvenous pacing is the treatment of choice for an emergency involving a slow heart rate (and for asystole) caused by AV blocks. Transfer to a specialized cardiology center may be advisable. Atropine administration (0.5-1.0 mg) may improve AV conduction in emergencies where bradycardia is caused by a proximal AV block (located in the atrioventricular node (AVN) but may worsen conduction if the block is in the His-Purkinje system. In general, the decision regarding implantation of a pacemaker must be considered with respect to whether or not AV block is permanent. Reversible causes of AV block, such as electrolyte abnormalities, if present, should be corrected first. Some diseases may follow a natural history to resolution (eg, Lyme disease), and some AV block can be expected to reverse (eg, hypervagotonia due to recognizable and avoidable physiologic factors, perioperative AV block due to hypothermia, or inflammation near the AV conduction system after surgery in this region). Conversely, some conditions may warrant pacemaker implantation owing to the possibility of disease progression even if the AV block reverses transiently (eg, sarcoidosis, amyloidosis, neuromuscular diseases). Finally, permanent pacing for AV block after valve surgery follows a variable natural history, and, therefore the decision for permanent pacing is at the physician's discretion. Types of cardiac pacemakers implanted in patients with heart block may include ventricular (usually VVI) or dual chamber (usually DDD) modes of pacing. The cardiologist or electrophysiologist should make the decision regarding the optimal mode of pacing.

Moya A et al. founded in their study that approximately (68.1%) required pacemaker at presentation with syncope. In our study about 82 % of patients with higher degree AV blocks need Pacemaker at presentation. This is most probably because they included in their study all form of syncope of which about 70 % were with higher degree AV blocks.24 Congenital third-degree AV block is rare, at 1 case per 20,000 births. In our study we have not found any person with congenital complete heart block.25 Forty Three (33.9%) of patients in our study have coronary artery disease, which was more common in inferior wall myocardial infarction i.e. 32(25.2%), these finding are in according with international data.[26,27] Movahed MR et al.

Table 4: Hospital out Comes

Treatment	No (%)
Response to Atropine	22 (17.32)
Temporary pacemaker Required.	105
PPM Required	43 (33.85%)

founded in their sudy that Third-degree AV block diagnosis was present 1.1% of the diabetics patients vs 0.6% in the control group. Similarly in our study about half of patients were diabetics, so supporting our data.[28] In our study 43(33.85%) required permanent pacemaker, while considering diabetics only i.e 55 patients, 30 (54.54%)of them required PPM in their presentation with higher degree of Heart block. The prevalence of patients with DM is significantly higher in patients who require permanent pacemaker treatment, suggesting the susceptibility of these patients to significant bradyarrhythmias.[29] Bundle-branch blocks in patients with DM could progress to higher-degree AV block, explaining our finding, but the evidence for this concept is lacking. However, there are many reports about the increased prevalence of high-degree AV blocks in patients with DM. Third-degree and high-degree AV blocks have been reported in DM cases during metabolic derangement and with postprandial stress.[30] Furthermore, the prevalence of DM with high-degree AV block has been found to be higher in patients requiring pacemaker treatment[31], and in patients with chronic heart block,[18] consistent with our finding. An autopsy report[32], in a small number of patients with DM and chronic heart block have shown changes in the conduction system typical for DM, such as diabetes microangiopathy. Degenerative changes in the AVN or bundle branches (eg, fibrosis, calcification, or infiltration) are the most common cause of nonischemic AV block.[2] In 69(54.33%) patients no cause were found to be responsible for higher degree AV blocks, so they were attributed to age related degeneration, so supporting our study, only a very limited patients responded to atropine i.e. 22 (17.32%),which support the international data.

Some of the patients in our study with suspected drug induce high degree AV blocks required permanent pacemaker which means that there was some underlying degenerative process in the conduction system so with administration of AV blocker drugs that latent process of degeneration in conducting system become evident.

Four (3.1%) patients died in our studied population. International data shows that mortality is less than 1%. These figures were higher in our patients because of the underlying disease that is long standing CRF and extensive anterior wall MI with cardiogenic shock.

CONCLUSION

Most patients aged more than 50 years. The common causes were ischemic and degenerative heart diseases. Presenting symptoms were vertigo, dizziness, presyncope, syncopal attacks and dyspnea. A quarter of patients responded to atropine of remaining half required permanent pacemaker.

LIMITATIONS

We did not routinely perfom connective tissue profile, thyroid function test and any other specific investigations except when these diseases were clinically suspected. Diagnostic electro-physiologic studies were not performed in any case to assess AV conduction and to discern the level of block (AV nodal or infranodal).Some patients with drug induced complete heart block needed permanent pacemaker which means that they had underlying degeneration of AV node but it was not studied.

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