ORIGINAL ARTICLE

Atrioventricular Blocks in Patients of Acute ST Elevation Myocardial Infarction

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ABSTRACT

Background: Local prevalence of atrioventricular block (AV Blocks) may help us to diversify guidelines for their presentation in cases of ST Elevation Myocardial Infarction (STEMI).
Aim: To find the frequency of atrioventricular blocks (1st, 2nd and 3rd degree) in acute STEMI
Methods: In a cross-sectional survey conducted at Department of Cardiology, Jinnah Hospital, Lahore. One hundred and fifty patients of acute STEMI were selected after informed consent. Atrioventricular blocks were labeled by standard interpretation of ECG. Data was stratified for type of STEMI i.e., anterior, inferior, lateral and posterior wall MI. Data was analyzed using SPSS. Post stratification for age, gender and type of STEMI was carried out using chi square test.
Results: 150 patients with mean age of 50.44 ± 6.7 years were included. Among them 112 patients (74.7%) were male and 38 patients (25.3%) were female. Out of 150 patients, 107 patients (71.3%) had anterior wall MI, 19 patients (12.7%) had posterior wall MI, 19 patients (12.7%) had inferior wall MI whereas rest of 5 patients (3.3%) showed positive results for lateral wall MI. In our study sample, 112 patients (81.3%) had no AV Block, 19 patients (12.7%) showed type 1 AV Block, 7 patients (4.7%) had type 2 AV Block and 2 patients (1.3%) had type 3 AV Block. Female patients with anterior wall MI are at risk of developing AV blocks.
Conclusion: It is concluded that frequency AV Block is high in patients with ST elevation myocardial infarction (18.7%). There is no effect of age on development of atrioventricular block but female patients with anterior wall MI are more prone.
Key words: Myocardial infarction, ST elevation Myocardial infarction, Acute coronary syndrome

INTRODUCTION

Complications of acute ST elevation myocardial infarction (STEMI) as atrioventricular (AV) blocks are often observed. First degree of atrioventricular block is most common and requires no treatment. Second degree block is sub classified in Mobitz type I and Mobitz type II. In Mobitz type I, AV block is often transient and requires no treatment. First degree and Mobitz type I block may occur in normal individual. In complete (third degree) heart block ventricular rate is slower, usually less than 50 beats/minute. [1]Hreybe H et al, in his study shows an association between inferior myocardial infarction and complete AV blocks. [2] The estimated annual incidence of MI in the United States is 600,000 new and 320,000 recurrent attacks. For those who survive acute myocardial infarction, a substantial risk of further cardiovascular complications including recurrent myocardial infarction, sudden cardiac death, heart failure, stroke and angina pectoris, is present.[3-7] Rationale comes from limited data in our population regarding this subject. Moreover, the local study by Bhalli et al focused old age group which can have wide influence on the results as age related cardiac conduction tissue degeneration may lead to AV blocks.[4]

Objective of this study was to determine the frequency of atrioventricular blocks (1st, 2nd and 3rd degree) in acute ST Elevation Myocardial Infarction. Our study is different as it focuses middle age group range of 30 to 60 years and hence minimizing the possibilities of age related pathologies as degenerative heart disease are seen more frequently with advancing age. Local prevalence of AV blocks may help us to diversify guidelines for their presentation in cases of STEMI.

SUBJECTS AND METHODS

A cross sectional survey was carried out in Department of Cardiology, Jinnah Hospital, Lahore from October 2014 to April 2015.Using non-probability, purposive sampling, 150 patients of acute STEMI were selected. STEMI was defined by presence of chest pain of more than 30 minutes and ECG showing any one of these: ST segment elevation of ≥ 2 mm in two contiguous chest leads or ≥ 1mm in two contiguous limb leads. AV blocks were assessed on ECG at time of presentation.PR Interval was defined as interval from beginning of P wave until the beginning of the QRS complex. First degree

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atrioventricular block was labelled if PR interval >0.20 seconds on Electrocardiogram (ECG). Second degree atrioventricular block included Mobitz type I (Progressive lengthening of PR interval culminating in dropped beat on ECG) and Mobitz type II (PR interval remains constant on ECG but some P-waves are not conducted resulting as absence of P-waves after regular interval in ratio of 2:1 or 3:1.) if there was complete dissociation of atrial and ventricular complexes, 3rd degree heart block was labelled. Patients with renal failure (serum creatinine more than 2mg/dl), old myocardial infarction & permanent pacemakers (evidence based on old record/past history), hypo or hyperkalemia (serum potassium <3.5 or >5.5 mEq/L) were excluded. Patients already on rate control drugs, β-blockers, linoxin, calcium channel blocker (verapamil, diltiazem), based on drug history were also excluded. Informed consent was taken from guardian of patients and was explained that the data would be used and published but confidentiality would also be maintained. Demographic profile was recorded including age, gender and address. ECG was conducted for each patient. Patients were labelled as anterior, inferior, lateral and posterior wall STEMI and frequency of atrioventricular blocks were recorded in each group. Occurrence of STEMI and atrioventricular blocks (1st, 2nd and 3rd degree), as per operational definition, were recorded. The data was analyzed by SPSS-17.0. Categorical variables such as AV blocks and gender were described as percentages ad frequencies. Frequency of AV blocks (1st, 2nd and 3rd degree) was measured and further stratified according to type of myocardial infarction (anterior, inferior, lateral and posterior wall). Post stratification chi square test was applied for significant difference in AV block degrees in different types of STEMI. P-value ≤0.05 was considered significant.

RESULTS

One hundred and fifty patients were included in the present study. Among them 112 patients (74.7%) were male and 38 patients (25.3%) were female. There were 83 patients (55.3%) between 40-50 years whereas 67 patients (44.7%) were above 50 years of age with mean age of 50.44±6.740 years (Table 1). In our study sample, 112 patients (81.3%) had no AV Block, 19 patients (12.7%) showed type 1 AV Block, 7 patients (4.7%) had type 2 AV Block and 2 patients (1.3%) had type 3 AV Block. According to MI, 107 patients (71.3%) had anterior wall MI, 19 patients (12.7%) had posterior wall MI, 19 patients (12.7%) had inferior wall MI whereas rest of 5 patients (3.3%) showed positive results for lateral wall MI (Table 2). Out of 112 male patients 100 showed not any type of AV Block however among rest of 12 males, 7 were Type 1 AV Block and 5 were Type 2 AV Block. Out of 38 females, 22 showed negative results, among rest, 12 female patients were type 1 AV block, 2 were type 2 AV block and 2 were type 3 AV block. On Pearson Chi Square test results were significant (p=0.000) (Table 3). To find out the age status of patients with AV Block, we cross tabulated age groups with AV block the results were non-significant (p=0.216). 7 patients with type-1 AV block, 4 patients with type-2 AV block and 2 patients with type-3 AV block were either 50 years of age or below whereas 12 patients of type-1 AV block and 3 patients of type-2 AV block were above 50 years of age (Table 4). When we cross tabulated types of MI with AV block the results were significant (p=0.006). One patient of type-1 AV block and 2 patients of type-2 AV block had posterior wall MI. Nine patients of type-1, 3 patients of type-2 and 2 patients of type-3 had anterior wall MI. One patient of type-1 AV block had lateral wall MI. Eight patients of type-1 AV block and 2 patients of type-2 AV block had inferior wall MI (Table 5).

Table 1: Descriptive information of the subjects

Variable	No.	%
Male	112	74.7
Female	38	25.3
Age (years)		
40 – 50	83	55.3
61 – 60	67	44.7

Table 2: Frequency and %age of AV blocks and MI

Variable	No.	%
AV Block		
None	112	81.3
Type 1	19	12.7
Type 2	7	4.7
Type 3	2	1.3
MI		
Anterior wall	107	71.3
Posterior wall	19	12.7
Inferior wall	19	12.7
Lateral wall	5	3.3

Table 3: Cross-tabulation of AV blocks genders wise.

AV Block	Male (n = 112)	Female (n = 38)
None	100	22
Type 1	7	12
Type 2	5	2
Type 3	-	2

P = 0.000 (Significant)

Table 4: Cross-tabulation of AV blocks according to age

AV Block	40 – 50 years	51 – 60 years
Type 1	7	12
Type 2	4	3
Type 3	2	-

P = 0.216 (Not significant)

Table 5: Comparison of AV blocks according MI

AV Block	Posterior wall MI	Anterior wall MI	Lateral wall MI	Inferior wall MI
Type 1	1	9	1	8
Type 2	2	3	-	2
Type 3	-	2	-	-

P = 0.006 (Significant)

DISCUSSION

Mortality secondary to complications of acute ST elevation myocardial infarction has been attributed to conduction abnormalities including arrhythmias and atrioventricular blocks.[5,6] Atrioventricular blocks are often observed in patients presenting with cardiac emergencies.[2] First degree of atrioventricular block is most common and requires no treatment and is not associated with MACE.[8] Second degree block is sub classified in Mobitz type I and Mobitz type II. In Mobitz type I, AV block is often transient and requires no treatment. First degree and Mobitz type I block may occur in normal individual. In complete (third degree) heart block ventricular rate is slower, usually less than 50 beats/minute.[1] In our study 17.3% patients had atrioventricular blocks. This result implies a higher frequency. But these results are comparable with previous studies. In a study by Archbold et al[5], AV blocks complicated acute myocardial infarction in 16% of cases and had a graded impact on the short- and long-term prognosis. While in another study by by Rembek et al[7], AV blocks with anterior STEMI was diagnosed in 39% of STEMI patients and 40.2% were diagnosed inferior STEMI with p<0.05. The difference from study by Rembek et al[7], may secondary to sample size, sampling technique and socio demographic difference.

In our study sample 19 patients (12.7%) showed type 1 atrioventricular blocks. It matches with results of previous studies concluding type I as most common atrioventricular blocks which requires no treatment. Seven pts (4.7%) had type 2 AV Block and 2 pts (1.3%) had type 3 AV block. Previous studies have shown that the percentage of first degree atrioventricular block was 0.8%, the percentage of second degree atrioventricular block was 0.8% and third degree atrioventricular block was 2.5%.

In the present study, 107 pts (71.3%) had anterior wall MI, 19(12.7%) had posterior wall MI, 19(12.7%) had inferior wall MI whereas rest of 5(3.3%) showed positive results for lateral wall MI. While in a study by Celik et al[6] the prevalence of anterior wall myocardial infarction was 41.25% while that of inferior wall MI was 52.9%. When we cross tabulated types of STEMI with AV Block the results were significant (p=0.006). One patient of type-1 AV block and 2 patients of type-2 AV block had posterior wall MI. 9 patients of type-1, 3 patients of type-2 and 2 patients of type-3 had anterior wall MI. 1 patient of type-1 AV block had lateral wall MI. 8 patients of type-1 AV block and 2 patients of type-2 AV block had inferior wall MI. It implies that atrioventricular blocks are more common in patients with anterior or inferior wall MI. our results matches with those by Rembek et al. They concluded that AV blocks with anterior STEMI was diagnosed in 39% of STEMI patients and 40.2% were diagnosed inferior STEMI with p<0.05.[7]

To find out the effect of age status of patients on development of AV Block, we cross tabulated age groups with different types of AV block, the results were non-significant (p=0.216). Seven patients with type-1 AV block, 4 patients with type-2 AV block and 2 patients with type-3 AV block were either 50 years of age or below whereas 12 patients of type-1 AV block and 3 patients of type-2 AV block were above 50 years of age. It implies that the development of atrioventricular blocks is independent of age of the patient.

CONCLUSION

It is concluded that frequency AV Block is high in patients with ST elevation myocardial infarction (18.7%). There is no effect of age on development of atrioventricular block but female patients with anterior wall MI are more prone.

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