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FREQUENCY OF COMPLETE HEART BLOCK AND IN-HOSPITAL MORTALITY IN PATIENTS WITH ACUTE ANTERIOR WALL MYOCARDIAL INFARCTION

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

All authors declare no conflict of interest.

ABSTRACT

Objective: To determine the frequency ofcomplete heart block in patients with acute anterior wall myocardial infarction.

Methodology: Study was conducted from 1st January to 30th June 2011 in the Cardiology Department of Lady Reading Hospital Peshawar. Patients who presented with acute anterior wall MI were included in the study. Those patients who was having renal failure, Hypo or Hyperkalemia, history of valve replacement, coronary artery bypass graft and those who were using Beta blocker,Lanoxin and Calcium channel blocker (Verapamil,Diltiazem) were excluded from the study.

Results: A total of 309 patients were included,out of which 228 (73.8 %) were male and 81 (26.2 %) were female, having mean age of 58.88 years. A total of 9 patients (2.9 %) developed Complete Heart Block (CHB), 7 were male and 2 were female (p=0.78). Thrombolysis was timely given in 246 (79.6%) patients.Among the thrombolysed patients, 7 (2.84%) developed CHB whereas 2 (3.17 %) from non thrombolysed group develop CHB (p=0.89).All the patients who develop CHB were temporarily paced. Out of all patients, 65 (18.1%) died, in whom 44 (17.9%) were thrombolysed and 12 (19.04%) not thrombolysed group (p=.84). Among those who develop high degree Atrioventricular block, 7 (77.77%) patients died.

Conclusion: CHB in anterior wall MI is an uncommon finding in this thrombolytic era but associated with high incidence of in-hospital death even if these patients are timely thrombolysed and paced.

Key Words: Myocardial Infarction, Complete Heart Block, Thrombolysis.

INTRODUCTION

Myocardial infarction (MI) is the irreversible necrosis of heart muscle secondary to prolonged ischemia. It is considered more appropriately a part of a spectrum referred to as Acute Coronary Syndrome (ACS), which includes ST-elevation MI (STEMI), non–ST-elevation MI (NSTEMI) and unstable angina.[1] Acute myocardial infarction (MI) is a common medical emergency and is the leading cause of death worldwide.[2] The estimated annual incidence of MI in the United States (including both STEMI and NSTEMI) is 600,000 new and 320,000 recurrent attacks. The risk of further cardiovascular complications, including recurrent MI, sudden cardiac death, heart failure, stroke and angina pectoris, for those who survive AMI is also substantial.[3]

The South Asian countries of India, Pakistan, Bangladesh, SriLanka and Nepal account for about a quarter of the world's population and contribute the highest proportion of the burdenof cardiovascular diseases including MI compared with any other region globally.[4-6] In Pakistan it is estimated that one in five middle-aged adults may have underlying coronary artery disease (CAD).[7] Prevalence of myocardial infarction is 11.2% in our local population and more common in females 13.3% than male 7.9%.[8]

Cardiac arrhythmias and conduction abnormalities complicating acute myocardial infarction are always associated with adverse prognosis. Patients with inferior MI more often experience conduction abnormalities but they are usually transient. In case of acute anterior MI the conduction abnormalities are less common but they are always serious and associated with high short and long-term mortalities. Patients with anterior MI are more likely to die before discharge than inferior or posterior MI (11.3 vs. 7.7%)[9], The overall Mortality is 27.9 per cent in patients with block and 9.3 per cent in those without; it was significantly higher in both anterior (47.0 per cent *vs* 11.8 per cent) and inferior (20.4 per cent *vs* 6.7 per cent) infarction groups.[10] In other study patients with Anterior MI mortality with complete atrioventricular block (CAVB) was significantly higher than in counterparts without CAVB:67% vs. 16%, respectively.[11]

Literature shows that frequency of high degree AV block is about 5% in acute anterior MI[12] High degree AV blocks in anterior MI should be aggressively managed and needs prompt Thrombolytic therapy, close monitoring and usually needs Permanent Pace maker (PPM) implantation. Some studies suggest that complete AV block in Anterior MI is reversible with primary Percutaneous Coronary Intervention (PCI) and survivors are not at increased risk of recurrent AVB. The decision of PPM should be delayed in these patients with successful revascularization to give enough time to AVB to resolve[10].

Though still high incidence of AVB is present in this Thrombolytic era but certain reduction of AVB occurred as compared to pre Thrombolytic era[11] Frequency of High degree AV block in Anterior MI varies in literature. The frequency of High degree AV block was high in pre thrombolytic era as compared to thrombolytic era. In pre thrombolytic era the frequency was 5.6%[10] to 8.6%.[13]In thrombolytic era the frequency is from 1%[14] to 2.8 %[15].

METHODOLOGY

This was aDescriptive cross sectional was conducted in Department of cardiology Study was started on 01/01/2011 and completed at 30/06/2011. Sampling technique was Non probability consecutive sampling. Sample size was 292, keeping proportion of CHB as 5%[12], 95% confidence interval and 1% margin of error, under WHO sample size estimation. But 309 patient's data collected during given time.

All patients with acute anterior wall MI (diagnosed by having chest pain of more than 30 minutes not relieved by two doses of glyceryl Trinitrate and ECG showing ST segment elevation of $\geq$2mm in two consecutive chest leads) of any age and either gender were included in the study. Patients with renal failure (creatinine more than 2mg/dl),History of coronary artery bypass graft, History of valve replacement or septal repair, Patients with hypo and hyperkalemia, and History of beta blockers, calcium channel blockers (varapamil, diltiazem), amiodarone and digoxin was excluded.CHB was defined as atrioventricular dissociation (no 1:1 correlation between P waves and QRS complexes) and escape junctional or ventricular rhythm.

All patients worked up with detailed history, clinical examination and all routine investigations were done. Careful history was taken regarding coronary bypass grafts, history of intake of drugs and records will be scrutinized for any renal failure. Serum electrolytes done to measure the serum potassium levels. On the basis of history, examinations and investigations all the conditions mentioned in the exclusion criteria were excluded to control confounders and bias in the study results. Written informed consent was taken. All the patients were managed according to hospital protocols. All the above mentioned information including name, age, and sex was recorded in a predesigned proforma.

Data was analyzed using statistical package for social sciences (SPSS) version 15. Categorical variables like sex and CHB presented as frequencies and percentages. Numerical variables like age presented as Mean $\pm$ SD. CHB stratified among age and sex to see the effect modifiers. Data presented in the form of tables and graphs.

RESULTS

A total of 309 patients were studied. Male patients were 228 (73.8%) and Female patients were 81 (26.2 %). Mean age of the study population was 58.88 years (range 20-100 years).

Patients categorized in to four groups according to age from

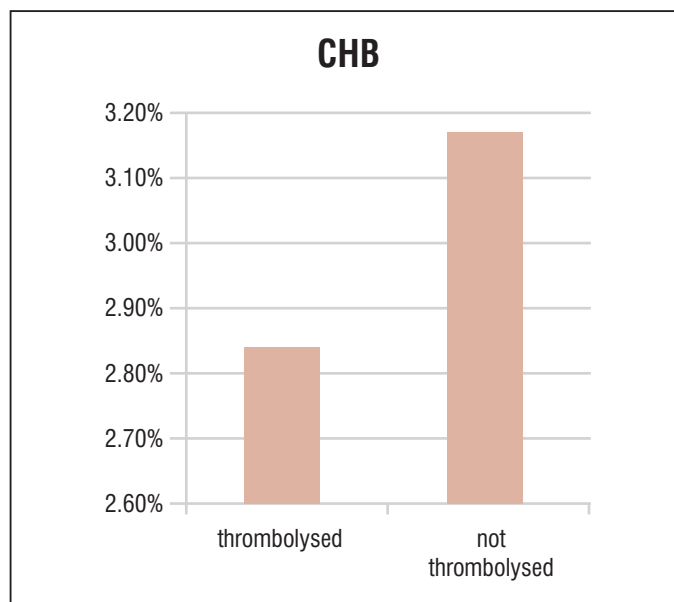**Figure 1: Frequency of CHB in thrombolysed and non thrombolysed patients**

Table 1: Mortality of Patients in Various Groups

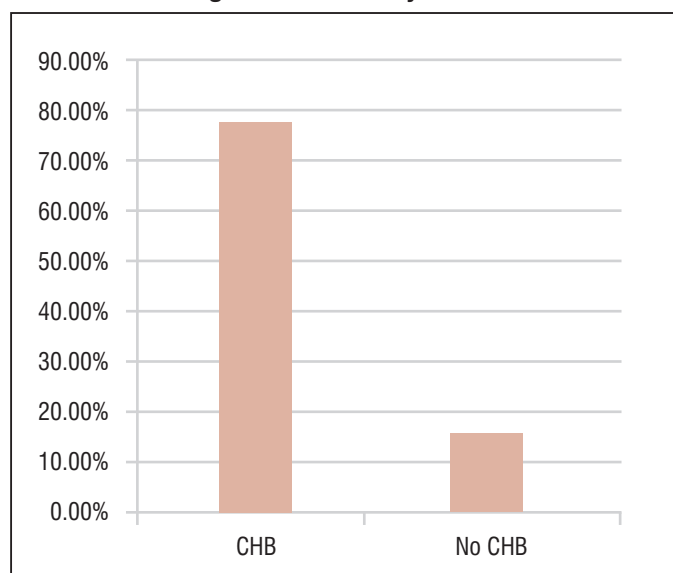|	Died Patients	Survived Patients
Total (n=309)	65 (18.10%)	244 (81.90%)
SK given (n=246)	44 (17.90%)	202 (82.10%)
SK not given (n=63)	12 (19.04%)	51 (80.96%)
CHB present (n=9)	7 (77.77%)	2 (22.23%)
CHB absent (n=300)	58 (19.33%)	242 (80.67%)

Figure 2: Mortality in CHB

Table 2: Outcomes in Thrombolysed in Non Thrombolysed Groups

Variables	Thrombolysed	Not Thrombolysed
Total patients (n=309)	246 (79.6 %)	63 (20.4%)
Total deaths (n=56)	44 (17.88 %)	12(19.04%)
CHB(n=9)	7(2.84 %)	2(3.17%)
Mortality in CHB (n=7)	6 (85.71%) of total CHB in SK group	1 (50%) of total CHB in non SK group

20 to 100 years. Group 1 was 20-40 years, group 2 was 41-60 years, group 3 was 61-80 years and group 4 was 81-100 years. There were 30 (9.7%) patients in group 1, 160 (51.8%) patients in group 2, 109 (35.3 %) patients in group 3 and 9 (2.9%) patients in group 4.

Out of total, 9 patients (2.9 %) developed complete heart block (CHB). (Figure 1) Among those Male patients were 7 (3.07%) and Female patients were 2 (2.46%) (p=.782). In group 1,only 1 patient (3.33%) developed CHB, whereas 3 patients (1.87%) and 5 patients (4.58%) developed CHB in group 2 and 3 respectively. Though CHB was more common in age 61-80 years but it is not significant statistically.

Out of total patients 246 (79.6%) were thrombolysed. Among thrombolysed patients, 7 (2.84%) develop CHB, where as in no thrombolytic group only 2 patients (3.17%) develop CHB (p=.89) {Figure 1}. During hospital stay 56 (18.1%) patients died. Among patients with CHB (n=9), 7 patients died (77.77%) {Table 1 and Figure 2}. Out of thrombolysed patients 44 died (17.9%), where as in non thrombolysed group,12 (19.04%) patients died (p=.84) {Table 1 and 2}.

DISCUSSION

This study was conducted in a tertiary care hospital. We receive patients with acute Myocardial infarction not only from Peshawar and nearby districts but also patients with acute MI come from far off areas of this province.

Mean age of our patients was 58.88 years. Same mean age group was described by Bhalli MA et all in a local study conducted at Abbott Abad which shows that mean age of patients with acute Myocardial infarction in this era is around 59 years.[11]

There were 73.8 % male in our study population. Same male, female ratio was found in other studies for acute ant wall MI, like one study did by Khan S et al, who studied 340 patients and found 75 % Male, which is very close to findings in our study.[19]

There were 9 patients (2.9 %) who developed CHB in our study. This finding was strongly supported by Escosteguy

CC et al, who found that the incidence of CHB in Anterior MI is 2.8%. Same frequency was noted by Bhalli MA et all who studied 174 cases of Anterior MI and found 5 cases of CHB (2.87%).[11,20]

Gupta MC et al and Norris RM found high frequency of CHB in Anterior MI that is 8.6 % and 5 % respectively[15,31]. This might be, because these studies were performed in pre thrombolytic era. So my study also favor that incidence of CHB is reduced in thrombolytic era as compared to pre thrombolytic era. In previous studies reduce incidence of CHBin thrombolytic era was found as compared to pre thrombolytic era.[13]

Among 228 Male patients, 7 developed high degree AV block (3.07%), where as in 81 Female patients, 2 developed high degree AV block (2.46%) (p=.782).Though there was high frequency of CHB in Male patients but was statistically insignificant.. Shirafkani A et al, also found that there is no difference in both sexes regarding CHB.[23]

Patients who develop CHB in our study population were categorized into 4 age groups. The frequency of CHB was more common in age group 61-80 years(4.58 %) but was statistically insignificant. Shirafkhani A et al found that there is no significant statistical correlation between the incidence of heart blocks and the patient's age[23].

Those patients who presented with anterior wall MI, most of them (79.6%) were thrombolysed. This finding is supported by other studies in which similar percentage of thrombolytic therapy was found. Bhalli et al, found 70 % thrombolytic rate in their study[11]. In WIRE registry, Habib et al, the rate of thrombolytic therapy was 68.3 % and 68 % respectively. [21,24]

There is conflicting evidence regarding the effect of thrombolytic therapy on prevention of CHB. The exact association of thrombolytic therapy with CHB is not known yet. Different studies have found different association. Khan S et al,found that the development of heart blocks is more common among those patients treated with thrombolytic therapy.[19] This finding was also supported by Rathor and Gersh who showed that the incidence of heart blocks is higher among those patients who had a history of

thrombolytic therapy.[25] This observation was not confirmed in the study of Melgare et al.[26] In my study, in total thrombolysed patients (n=246), 7(2.84%) develop CHB, where is in non thrombolytic group (n=63) only 2 patients (3.17%) develop CHB (p=.89). The GISSI-1 study 23 reported similar incidences of complete atrioventricular block in the streptokinase group and nonthrombolytic-treated controls respectively.[27] My findings are more consistent with the GISSI-1 study 23, because we found similar incidence of CHB in both Thrombolytic and non thrombolytic groups.

In our study out of all patients, 65 (18.1%) patients died. This means that there is high mortality associated with Anterior MI. Patients with an anterior AMI were at a higher risk of death in several studies[20,26]. Hreybe H et al[30] also found high incidence of in hospital mortality in acute Ant MI. They found that patients with anterior or lateral AMI were more likely to die prior to hospital discharge than patients with an inferior or posterior AMI (11.3% vs. 7.7%).The finding in our study is little high than this finding because in our set up patients come from far off areas and there is delay in the presentation to hospital. Most of the patients are diagnosed late and several hours pass between chest pain and arrival to hospital. Moreover the mentioned study was done in USA where most of the patients present early to hospital. They are Thrombolysed in time and most of the time Primary PCI is done well on time.

CHB is associated with high morbidity and mortality.[20] CHB is associated with 77.77% mortality in my study. Those patients who didn't develop CHB only 16.1% died. This means that CHB is associated with high in hospital mortality. Ginks WR et al [28] and Norris RM et al[31]already found that in anterior wall infarctions, high-degree (second- or third-degree) block is associated with larger infarct size and a poorer in hospital prognosis. Hreybe H et al[30]also found that evidence of complete heart block were more likely to die prior to hospital discharge compared to patients who did not exhibit these higher risk characteristics. This high incidence of in hospital mortality in our study (77.77%) was also supported by some previous studies. Escosteguy CC et al, found that mortality associated with CHB in Ant MI is 90%[20]. In a study in India by Gupta MC et al, 17 out of 19 patients with CHB in Ant MI died(89.5%)[15]. In this study of Gupta MC et al[15] 5 patients with CHB in Ant MI were paced by TPM, in whom 4 patients (80 %) died. This finding as same as in my study in which in 9 paced patients, 7 (77.77 %) died..So the findings of very high mortality in our study are close to these previous studies and not by chance. NORRIS RM found exactly same rate of in hospital death in patients with CHB in Anterior MI. He found 75 % mortality in CHB in Anterior MI.[31]

Total in hospital deaths in my study were 56,out of which 44 died in thrombolysed group with 17.9 % mortality rate and 12 died in non thrombolysed group with 19.04 % mortality rate (p=.84).This means that mortality associated with CHB is similar in both thrombolysed and non thrombolysed groups. Previous studies showed that mortality associated with the development of complete atrioventricular block remained high even with thrombolytic therapy.[22]

STUDY LIMITATION

There were only 309 patients in the study. Moreover there were only 9 cases of CHB found in the whole study. Only 2 patients were in non thrombolytic group. So due to this much small number of cases the given result may be not truly representative of the actual outcomes in sense of mortality, and association with thrombolytic therapy. In case of more protracted study and large number of cases, more important data can be obtained and the exact association with mortality and thrombolytic therapy can be obtained. Regarding association with age I could not found any case of CHB above 80 years due to few patients in that age group, so large data is needed to find exact findings in different age groups. CHB in anterior MI is an ominous predictor of mortality, so all patients who present with CHB in Anterior MI should be immediately thrombolysed preferably by primary PCI and should be paced in time. They should be closely monitored in Cardiac care unit and should be immediately treated in case of complication like cardiogenic shock. Almost all patients need PPM and should be admitted for longer and observe for several days if block is reversed to prevent late complications.

CONCLUSION

Complete atrioventricular block in anterior wall MI is a uncommon finding in this thrombolytic era but associated with high incidence of in hospital death even if these patients are thrombolysed and paced.

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