

COMPARISON OF IN-HOSPITAL MORTALITY IN PATIENTS WITH ST ELEVATION MYOCARDIAL INFARCTION WITH AND WITHOUT 3RD DEGREE AV BLOCK

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ABSTRACT

Objectives: To determine the frequency of third degree atrioventricular blocks in patients with ST elevation myocardial infarction and to determine the association between In-Hospital Mortality in patients with ST-Elevation Myocardial Infarction (STEMI) and third degree AV Block.

Study Design: Comparative cross-sectional study.

Study Setting and Duration: Department of Cardiology, Armed forces institute of Cardiology & National Institute of Heart Diseases, Rawalpindi from June 2018-November 2018.

Material and Methods: This was a comparative cross-sectional study. Patients fulfilling selection criteria were enrolled in the study through Emergency of department of AFIC & NIHD, Rawalpindi after their Informed consent. Patients between the ages of 25-75 years of both genders presenting with STEMI admitted in cardiology wards were included in the study while patients with previous MI, PCI or CABG or patients already taking treatment for AV block were excluded from the study. All patients were admitted in wards and were followed-up. During hospital stay of 3 days, patients were evaluated through ECG for the detection of AV block and their thrombolysis history was also noted. Two groups will be formed; group-1 with 3rd degree AV block and group-2 without 3rd degree AV block. Patients were followed-up further in cardiology wards and in-hospital mortality of patients was noted. Data was entered and analysed using SPSS-23.

Results: A total of 334 patients were recruited in the study out of which 207 (61.9%) were male patients while 127(38.0%) were female patients. Mean age of the patients was 62 ± 7.9 years. Patients with anterior wall MI were 171 (51.1%), inferior wall MI 127 (38.0%) and lateral wall MI in 36 (10.7%) patients. Patients who developed complete heart block were 15(4.5%). Out of total sample size 286 (85.6%) were discharged while 48 (14.4%) expired. As far the comparison between groups are concerned, patients with inferior wall MI developed complete heart block more 9 (60.0%) as compared to anterior wall 3(20.0%) and lateral wall MI 3 (20.0%). Mortality was more in patients with anterior wall MI.

Conclusion: Complete heart block is a recognized complication in patients with STEMI and is associated with worse outcomes. Our study results showed that frequency of complete heart block in STEMI patients receiving contemporary management is quite low.

Keywords: Third Degree Atrioventricular Block, ST-Elevation Myocardial Infarction, In-Hospital Mortality, Anterior Wall Myocardial Infarction.

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INTRODUCTION

In patients with myocardial infarctions, atrioventricular (AV) block usually develops gradually, progressing from first-degree or a type I second-degree block. In most patients, the level of the block is supranodal or intranodal, and the escape rhythm is usually stable with a narrow QRS and rates exceeding 40 bpm. Complete heart

block (CHB) in patients with an MI usually responds to atropine. In most patients, it resolves within a few days without the need for a temporary or permanent pacemaker^{1,2}. Third degree AV block is a relatively frequent complication in patients hospitalized with acute MI. Patients who develop CHB in the setting of AMI have a 3 to 5 fold increase in in-hospital mortality compared with those without CHB³.

Patients with inferior AMI are considerably more prone to 3rd degree AV block development

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and have a two- to fourfold increased risk of 3rd degree AV block compared with patients with anterior location of the AMI. ST-segment elevation myocardial infarction (STEMI) also increases the risk of 3rd degree AV block compared with patients with non-STEMI⁴. In the pre-thrombolytic era, second- or third-degree AV block was recorded in 4.7% to 7.7% of patients presenting with acute MI. In the thrombolytic era, Meine *et al.* reported that the overall incidence was little changed at 6.9% with inferior MI⁵. One study

The rationale of this study is to determine the frequency of 3rd degree AV block in patients with STEMI and then find the association of in-hospital mortality in STEMI patients with or without 3rd degree AV block. Literature has showed that, the frequency of 3rd degree AV block was low in patients of STEMI. But controversial data has been retrieved from literature. Moreover, the literature found showed that the incidence of In-Hospital Mortality in Stemi complicated by 3rd degree AV block is

Table-1:

Parameters	n (%)
Age (mean ± SD)	62 ± 7.9 years
Gender	
Male	207 (61.9%)
Female	127 (28.0%)
Type of Myocardial Infarction	
Anterior wall MI	171 (51.1%)
Inferior wall MI	127 (38/0%)
Lateral wall MI	36 (10.7%)
Complete Heart Block	
Present	15 (4.5%)
Absent	319 (95.5%)
Patients Discharged	286 (85.6%)
Patients Expired	48 (14.4%)

Table-II: Showing Myocardial Infarction distribution in complete heart block patients.

Type of MI	Complete Heart Block			
	Present 15(4.5%)		Absent 319 (95.5%)	
	Expired	Discharge	Expired	Discharge
	9 (60.0%)	6 (40.0%)	48 (15.0%)	271 (84.9%)
Anterior Wall MI	2 (13.3%)	1 (6.6%)	30 (9.4%)	138 (43.2%)
Inferior Wall MI	6 (40.0%)	3 (20.0%)	14 (4.3%)	104 (32.6%)
Lateral Wall MI	1 (6.6%)	2 (13.3%)	4 (1.2%)	29 (9.0%)

found that 3rd degree AV block was present in 3.2% cases of STEMI. But in a Pakistani study, it has been reported that high degree or 3rd degree AV block occurs in 1.3% cases of STEMI⁶.

The incidence of CHB increased from 2.1% in 2003 to 2.3% in 2012 (adjusted OR per year: 1.02; 95% CI: 1.01 to 1.03).⁷ It has been reported that of 2,273,853 patients with STEMI, 2.2% had CHB. In patients with CHB, in-hospital mortality occurred in 20.4% and in 8.7% without CHB (OR: 2.68; 95% CI: 2.62 to 2.74; $p < 0.001$)⁸.

significantly higher than those without 3rd degree AV block (i.e 20.4 % vs 8.7). So we cannot neglect the screening of STEMI patients for 3rd degree AV block, as it is significantly associated with in-hospital mortality⁸.

As not much evidence has been found regarding association of 3rd degree AV block with in-hospital mortality. And 3rd degree AV block is major cause of mortality after STEMI. So we want to conduct this study to get the local evidence to apply results of study in local setting.

MATERIAL AND METHODS

This was a comparative cross-sectional study. Patients fulfilling selection criteria were enrolled in the study through Emergency of department of AFIC & NIHD, Rawalpindi after their Informed consent. Patients between the ages of 25-75 years of both genders presenting with STEMI admitted in cardiology wards were included in the study while patients with previous MI, PCI or CABG or patients already taking treatment for AV block were excluded from the study. All patients were admitted in wards and were followed-up. During hospital stay of 3 days, patients were evaluated through ECG for the detection of AV block and their thrombolysis history was also noted. Two groups will be formed; group-1 with 3rd degree AV block and group-2 without 3rd degree AV block. Patients were followed-up further in cardiology wards and in-hospital mortality of patients was noted. Data was entered and analysed using SPSS-23.

RESULTS

A total of 334 patients were recruited in the study out of which 207 (61.9%) were male patients while 127 (38.0%) were female patients. Mean age of the patients was 62 ± 7.9 years. Patients with anterior wall MI were 171 (51.1%), inferior wall MI 127 (38.0%) and lateral wall MI in 36 (10.7%) patients. Patients who developed complete heart block were 15 (4.5%). Out of total sample size 286 (85.6%) were discharged while 48 (14.4%) expired as shown in table-1.

Total number of patients with complete heart block were found to be 15 (4.5%), out of which 9 (60.0%) patients expired while 6 (40.0%) patients were discharged as shown in fig.

As far the comparison between groups are concerned, patients with inferior wall MI developed complete heart block more in 9 (60.0%) patients as compared to anterior wall MI in 3 (20.0%) patients and lateral wall MI in 3 (20.0%) patients. Mortality was more in patients with anterior wall MI as shown in table-II.

DISCUSSION

In this study of patients hospitalized with STEMI, we found that even in the contemporary era of prompt reperfusion therapy, complete heart block remains associated with significantly higher in-hospital mortality. This was true both in patients with anterior and inferior STEMI, although prevalence was significantly higher in patients with anterior STEMI. Previous studies have reported varying incidence rates of complete heart block complicating STEMI with more recent studies reporting lower incidence rates⁹⁻¹¹. The TAMI

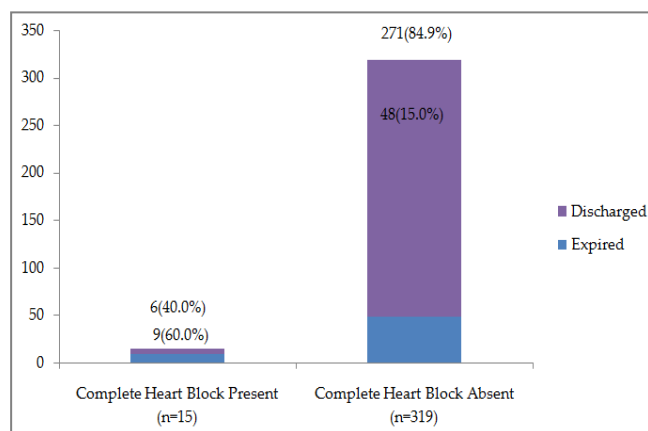


Figure: Distribution of patients expired and discharged.

(Thrombolysis and Angioplasty in Myocardial Infarction) study group reported that the incidence of complete heart block in 373 patients with inferior STEMI who received thrombolytic therapy was 13%¹². The incidence of complete heart block among 6,676 AMI patients screened for entry into the TRACE (Trandolapril Cardiac Evaluation) randomized trial was 5%¹³. Analysis of data from the Worcester Heart Attack Study showed that the overall incidence of CHB in 13,663 AMI patients was 4.1%, with a significant decline in CHB incidence from 1975 to 2005¹⁴.

In comparison, the frequency of complete heart block complicating STEMI in our study was 4.5%, much lower than what was observed in previously mentioned international studies^{10,12,14}. This likely reflects the overall improvement in the

care of STEMI patients over the years, with increasing early use of guideline-recommended invasive reperfusion strategies and adjunctive medical therapies, thus reducing ischemic time, limiting infarct size, and preserving ventricular function, all of which could potentially contribute to lower complete heart block incidence. Although the prevalence of complete heart block in our study was lower throughout the study period in comparison to that previously reported. Concordant with the findings of previous studies^{14,15}. We found that the frequency of complete heart block complicating STEMI was higher in patients with inferior STEMI compared with anterior or other STEMI. Complete heart block complicating anterior STEMI is usually within the His-Purkinje system and is related to interruption of septal perfusion accompanied by extensive myocardial damage and significant left ventricular dysfunction¹⁵. In inferior STEMI, CHB usually occurs at the atrioventricular (AV) nodal level and is usually related to hypoperfusion of the AV nodal artery, which typically arises from the right coronary artery. Consistent with these observations, we found that the negative prognostic impact of complete heart block was greater in patients with anterior STEMI than it was in patients with inferior STEMI¹². This also likely reflects the underlying differences in the pathogenesis of complete heart block in patients with anterior STEMI compared with those with inferior STEMI. Our findings reaffirm that CHB remains a severe prognostic marker in patients with STEMI in the current PCI era. Previous studies^{8,10}. Predominantly from the thrombolytic era, have also reported in-hospital mortality rates between 20% and 30% in patients with CHB in the setting of STEMI. Data on the temporal trends in in-hospital mortality in these patients have been conflicting. Analysis of 13,663 patients with AMI in the Worcester Heart Attack Study showed a significant decline in in-hospital death rates from 1975 to 2005 in patients with concomitant CHB. Analysis of the GRACE registry also did not show a significant decline in in-hospital

mortality in patients. Our data show that complete heart block remains an adverse prognostic marker in STEMI patients in the PCI era, with the association between complete heart block and worse in-hospital outcomes being more significant in patients with anterior STEMI. Despite advances in STEMI care over the last several years, in-hospital mortality associated with complete heart block has not declined. Hence, future investigations should focus on developing strategies to improve outcomes in patients with STEMI complicated by complete heart block.¹⁶ In the meantime, early reperfusion and adjunctive medical therapies for STEMI aimed at attenuating ischemic injury should be aggressively pursued because these could potentially affect the incidence of and outcomes associated with complete heart block.

CONCLUSION

Complete heart block is a recognized complication in patients with STEMI and is associated with worse outcomes. Our study results showed that frequency of complete heart block in STEMI patients receiving contemporary management is quite low.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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