FREQUENCY OF COMPLETE HEART BLOCK IN PATIENTS PRESENTING WITH INFERIOR WALL MYOCARDIAL INFARCTION

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ABSTRACT

Background: Patients presenting with acute coronary syndromes can develop a variety of conduction abnormalities. Complete heart block is a common manageable complication seen more frequently in inferior STEMI.

Objective: To determine the frequency of complete heart block in patients with acute inferior wall myocardial infarction

Methods: Descriptive cross-sectional study conducted in Cardiology Department Khyber Teaching Hospital Peshawar from 23 Dec 2019 to 23 Jun 2020. Patients admitted with acute inferior wall myocardial infarction were included in the study. The presence or absence of complete heart block was made with standard 12-lead ECG and continuous cardiac monitoring during hospital stay.

Results: A total of 223 patients were enrolled in the study. The mean age was 63.86±7.18 years, and most patients were male (n. = 157.67.8%) and over 60 years of age (n = 175.75.1%). Complete heart block (CHB) was recorded in 18.5% of patients. Compared to younger patients, those over 60 years of age were significantly more likely to develop CHB (21.7% vs. 8.6%, p = 0.026).

Conclusion: Complete heart block is a common complication of acute inferior wall myocardial infarction. Its occurrence is significantly more common in elderly populations.

Keywords: Myocardial infarction, Inferior Wall Myocardial Infarction, Complete Heart Block

INTRODUCTION

Coronary Artery Disease (CAD) is the leading cause of mortality and morbidity worldwide with an estimated 244 million people suffering from CAD. Asian populations carry a high burden of CAD. [1,2] Patients presenting in an emergency due to acute total occlusion of a coronary artery leading to ST-Elevation Acute Coronary Syndrome (STE-ACS) mandate early reperfusion to reduce its associated high mortality and morbidity. [3]

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During index myocardial infarction (MI) most of the cardiovascular deaths are due to electrical or mechanical complications. [4] Some electrical complications including Sinus node dysfunction and atrioventricular (AV) node dysfunction is more common with ischemia involving right coronary artery territory. [5] Aging, smoking, and high Killip class are predictors of high-degree AV blocks. Renal failure is another factor associated with the increased frequency of high-degree AV blocks. Patients with high degree AV blocks have both increased in-hospital and long-term mortality. [6, 7] Compared to anterior ischemia, complete heart block occurs more frequently in inferior wall MI and patients are sicker at presentation with hemodynamic collapse and syncope, the reason of increased AV blocks in inferior ischemia being the AV nodal blood supply which occurs mostly from right coronary artery. Their hospital course is usually associated with worse outcomes and many needs invasive ventilator support. [8] The incidence of Complete AV Block (CAVB) is significantly low in Anterior STE-ACS patients compared to non-anterior STE-ACS. [9] Local studies have reported varying incidence of complete heart blocks in inferior wall MI patients. [10-12]

The rationale of this study is to generate updated local data regarding complete heart

block in patients with inferior STE-ACS. Identification of high-risk patients will be helpful to deliver early and appropriate interventional therapy to improve clinical outcomes. Moreover the results of this study will be important for further research advancement and making local guidelines.

MATERIAL AND METHODS

This Descriptive cross-sectional study was conducted in Cardiology Department Khyber the referenceTeaching hospital from 23 Dec, 2019 to 23 Jun, 2020. Sample size of 233 was taken, by using prevalence of complete heart block 18.6%[10] in inferior wall MI, 95% confidence level, and 5% margin of error according to WHO formula for sample size calculation. Non-Probability consecutive sampling was done.

All the patients in age range 30-80 years presenting with acute inferior wall MI within 24hrs of the onset of symptoms of either gender were included. While Patients with previous angioplasty/MI (on the bases of history), those with preexisting documented AV blocks, sick sinus syndrome, Concomitant anterior MI, History of drugs causing AV Block like beta blocker and Calcium Channel Blocker, Hyperkalemia (K>6mmo1/1), hypokalemia (K< 3.5 mmol/l) were excluded.

After taking the approval from hospital ethical committee, all eligible patients were enrolled in the study through emergency and Cardiology Department. Written informed consent was taken from all participants. Standard 12 lead ECG recorded before/after admission was used to confirm diagnosis of acute inferior wall MI. Presence or absence of complete heart block as made with standard 12 lead ECG at the time of admission and cardiac monitoring during hospital stay. Temporary pacemaker or intravenous atropine was considered if any type of bradycardia causes symptoms and signs of low perfusion. Thrombolytic therapy was employed to the patients in absence of known contraindications. All the information like age, gender, BMI [when patients stabilized using standard formula of BMI=weight in kg/height [m2] smoking, hypertension and diabetes [known documented history] was recorded in predesigned proforma. Strictly exclusion criteria were followed to control confounders and bias in the study results.

The data was analyzed with SPSS version 20. Mean and standard deviation were computed for continuous variables like age, height, weight, BMI. Frequencies and percentages were computed for categorical variables like gender, smoking, hypertension, diabetes and complete heart block. Complete heart block was stratified among age, gender, BMI, smoking, hypertension, diabetes, positive family history, dyslipidemia and obesity to see the effect modification. Post stratification chi square test was applied in which p value < 0.05 was considered as significant.

RESULTS

A total of number 233 patients meeting the inclusion criteria were studied. Mean age ±SD of studied population was 63.86±7.180. The number of patients less than 60 years of age were 58 (24.9%) while those 60 years and above were 175 (75.1%). 158 (67.8%) patients were males while 75 (32.2%) patients were females. The prevalence of cardiovascular risk factors was quite high in the studied population. (Table 1)

Complete Heart Block (CHB) was recorded in (18.5%) of patients with Acute Myocardial Infarction (AMI). Complete Heart Block (CHB) was stratified with age groups, gender groups and family history for CVD, smoking status, dyslipidemia and obesity. There was no effect of these variables on CHB except age where elderly patients showed significantly higher rates of CHB (Table 2)

Table 1: Baseline Characteristics of Patients

Mean Age	63.86 ±7.18
Gender	
Male	67.8 % (n=158)
Female	32.3% (n=75)
BMI	28.55 ± 2.78
CVD Risk Factors	
DM	44.6% (104)
HTN	47.2% (110)
CAD Family History	45.5% (106)
Obesity	39.9% (93)
Dyslipidemia	67.4% (157)
Smoking	46.8% (109)

Table 2: CHB and Patient Characteristics

Patient Characteristics	CHB % (n)	P value
Age Group <60 years ≥60 years	8.6 % (5) 21.7 % (38)	0.026
Gender Male Female	21.5 % (34) 12.0 % (9)	0.08
HTN Normotensive	17.27 % (19) 19.5 %(24)	0.660
Diabetics Non-Diabetics	21.15 % (22) 16.27 % (21)	0.340
Dyslipidemia No Dyslipidemia	17.83 % (28) 19.73 % (15)	0.726
Obese Non-Obese	19.35 % (18) 17.85 % (25)	0.773
Smokers Non-Smokers	14.67 % (16) 21.77 % (27)	0.164
Family history of CVD No family history of CVD	18.86 % (20) 18.11 % (23)	0.882

CHB: Complete Heart Block, HTN: Hypertension, CVD: Cardiovascular Disease

DISCUSSION

In our study the overall incidence of complete heart block was 18.5% and there was significant association of CHB with age. The incidence of High degree AV blocks varies ranging from very low to very high rates in literature. A rate of 28% high degree AV Block was reported in one study, but they failed to describe the exact number of complete heart block amongst these patients.[11] This study looked into the impact of high degree AV blocks on patient outcomes and concluded that AV blocks results in poor patient outcomes including increased risk of cardiogenic shock, post MI angina, syncope and high mortality. [11] Data also shows that the incidence of AV blocks is relatively high in patients presenting late to hospital underscoring the importance of early treatment of STEMI patients. We didn't looked for the presentation time but one reason for the high incidence of CHB in our study is probably the older population. The mean age of population was 63.8 ± 7.18 while most of the other studies included relatively younger populations.[11-12] Earlier studies have also demonstrated that aging people have a high risk of developing AV blocks. [12] Lower rates (13.9%) of complete AV block were reported previously in a local study but their study population was younger with a mean age of 57±11.34 SD and majority were male patients.[13] In our study other cardiovascular risk factors were quite frequent but there was no

association of CHB and these risk factors. Another very important difference was that these patients were treated with primary PCI unlike our patients who received thrombolytic therapy for reperfusion while tailoring therapy for CHB according to patient symptoms and clinical status. This study also demonstrated that CHB resolved in most of those treated with Primary PCI[13] One study has demonstrated that the severity of stenosis is critical in patients with CHB secondary to Inferior STEMI compared to similar individuals without complete heart block. [14] In addition complete heart block secondary to acute ischemia frequently recovers and is less likely to be treated with permanent pacemaker. [15] On the contrary those with advanced AV blocks in the absence of acute ischemia need permanent pacing because very few of these shows underlying obstructive coronary artery disease and treating this has failed to resolve the conduction abnormalities. The reason being there is permanent damage to the conduction system caused by epicardial and microvascular ischemia. [16] Aging, smoking and high Killip Class are predictors of high degree AV blocks. Renal failure is another factor associated with increased frequency of high degree AV blocks.[6, 7]

Based on our results we recommend that due to the high incidence of CHB patients with inferior wall MI these patients need to be monitored closely for conduction abnormalities specially aged patients must be watched very closely because these in not treated emergently may lead to poor outcomes.

Limitation: This was a single center study and involved limited number of patients. CV risk factors including HTN were not properly defined, any history of current or past smoking irrespective of quantity and duration was labeled as smokers. In addition, all patients were labelled dyslipidemic if any one or more of their lipid components including LDL-C, HDL-C, Triglycerides or total cholesterol was high.

CONCLUSION

Frequency of complete heart block is high in patients with inferior wall myocardial infarction. Its occurrence increases significantly with aging.

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