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FREQUENCY OF ATRIOVENTRICULAR BLOCKS IN INFERIOR WALL MYOCARDIAL INFARCTION

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ABSTRACT

Background: Inferior wall myocardial infarction (MI) is often associated with conduction disturbances due to its impact on the atrioventricular (AV) node, primarily supplied by the right coronary artery. Identifying the frequency and type of AV blocks in such patients is essential for prompt management.
Objective: To determine the frequency of various degrees of AV block in patients presenting with inferior wall MI.
Methods: A descriptive cross-sectional study was conducted at Rehman Medical Institute, Peshawar, from August to November 2024. A total of 192 patients aged 35–70 years with confirmed inferior MI were enrolled using a convenient sampling technique. Patients with pre-existing AV block or conduction abnormalities from other causes were excluded. Standard 12-lead ECG was used for diagnosis. Patients were categorized into AV block-positive and AV block-negative groups. AV blocks were further classified as first-degree, second-degree (Mobitz Type I and II), or third-degree.
Results: Out of 192 patients, 58 (30%) developed AV blocks. First-degree AV block was observed in 28 patients (15%), second-degree Mobitz Type I in 4 patients (2%), and third-degree AV block in 25 patients (13%). No cases of Mobitz Type II were detected. AV blocks were more frequent in males and in patients with STEMI.
Conclusion: Atrioventricular blocks are a common complication of inferior wall MI, affecting approximately 30% of patients. First-degree and third-degree blocks were the most prevalent. These findings highlight the importance of early ECG evaluation and continuous cardiac monitoring to guide timely management.

INTRODUCTION

Myocardial infarction (MI) remains a leading cause of morbidity and mortality worldwide, with inferior wall MI accounting for a significant proportion of acute coronary syndromes. The inferior wall of the heart is typically supplied by the right coronary artery (RCA), which also perfuses the atrioventricular (AV) node in most individuals. As a result, conduction disturbances, particularly AV blocks, are commonly observed in inferior wall MI (1)(2).

AV blocks are categorized based on the degree of conduction delay or interruption between the atria and ventricles. First-degree AV block involves a prolonged PR interval without missed beats, while second-degree blocks are subdivided into Mobitz Type I (Wenckebach) and Mobitz Type II. Third-degree (complete) AV block is characterized by complete dissociation between atrial and ventricular activity. These conduction abnormalities, though sometimes transient, can significantly impact clinical outcomes and require immediate attention, especially in patients with bradycardia or hemodynamic compromise(3)(4).

Globally, ischemic heart disease (IHD) remains a public health burden, and in Pakistan, rising rates of hypertension, diabetes, smoking, and sedentary lifestyles have contributed to increased cardiovascular risk. Despite this, limited local data exist on the specific patterns and prevalence of AV blocks in inferior wall MI(5)(6).

Understanding the distribution and frequency of AV blocks in this setting is crucial for optimizing clinical decision-making, including the use of temporary pacing and risk stratification. This study, therefore, aimed to assess the frequency and types of AV blocks in patients presenting with inferior wall MI at a tertiary care hospital in Peshawar, Pakistan(7).

Method And Material

The study was a cross-sectional study conducted at Rehman Medical Institute (RMI). The study duration was 4 months. The sample size was calculated using the formula $n = z^2 \times p(1-p)/E^2$, where the estimated prevalence (p) was 14.4%, the margin of error (E) was taken as 5%, and the Z value for a 95% confidence level was 1.96. A total of 192 patients were selected from the population presenting with AV blocks in inferior wall MI at Rehman Medical Institute, Peshawar, Khyber Pakhtunkhwa, Pakistan. A convenient sampling technique was used for selecting the participants.

The inclusion criteria were all patients with inferior wall MI and all patients with inferior wall MI with AV blocks. The exclusion criteria included AV blocks due to other diseases and AV blocks without MI. After receiving approval from the GSC, the Head of Department at chosen hospitals sought permission from the ethics committee. Data was obtained from selected participants using a self-created questionnaire.

RESULTS

The total sample size for this study was 192 patients, divided into two groups: AVB-positive and AVB-negative. Out of 192 patients, 58 (30.2%) had inferior wall myocardial infarction (MI) with AV block, while 134 (69.8%) did not. The majority of patients did not develop AV block. Among those who did, first-degree AV block was the most common, followed by third-degree AV block. Second-degree Mobitz Type II AV block was not observed in any patient. Male ratio was higher than female Fig. 1.

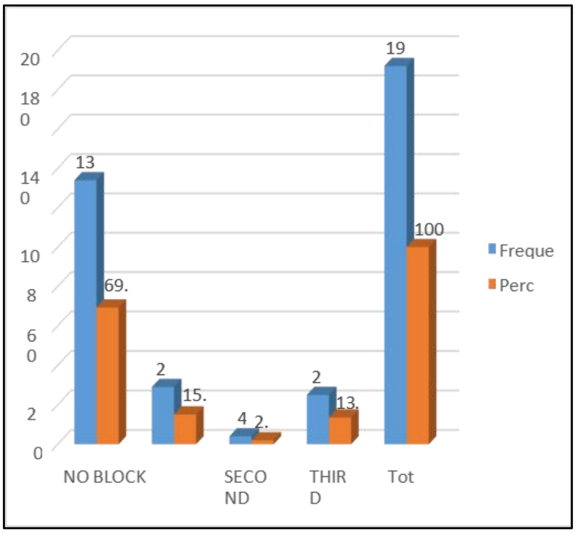

Fig.1. Frequency and percentage of AV blocks and MI

The total sample size for this study was 192 patients. The distribution of AV blocks was analyzed across different age groups: 40–50 years, 51–60 years, and 61–70 years. First-degree AV block was the most common across all age groups. Among the 192 patients, third-degree AV blocks were more prevalent in older age groups, indicating a correlation between age and severity of AV block. From 40 to 50, out of 192, 15 (7.81%) patients had 1st degree AV block, 0 (0%) patients had 2nd degree Type I, and 3 (1.56%) patients had 3rd degree AV blocks. Patients aged from 51–60, out of 192, 10 (5.20%) patients had 1st degree AV blocks, 1 (0.525%) patient had 2nd degree Mobitz Type I, and 10 (5.2%) had 3rd degree AV block.

Patients ranging from 61 to 70, out of 192, 4 (2.08%) patients had 1st degree AV blocks, 3 (1.57%) patients had 2nd degree Mobitz Type I, and 12 (6.24%) patients had 3rd degree AV blocks in Fig. 2.

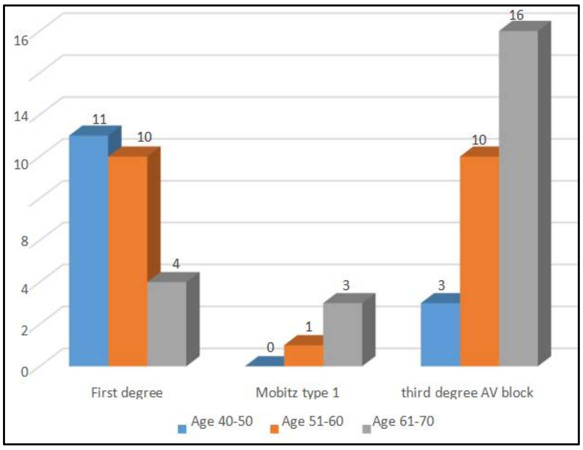

Fig. 2. AV blocks on age basis

Among the 192 patients, 129 (67.18%) were male and 63 (32.81%) were female. AV blocks were more common in males (45 cases) compared to females (13 cases). In males, first-degree and third-degree AV blocks were more frequent, whereas in females, the overall occurrence of AV blocks was lower but followed a similar distribution pattern in Fig. 3.

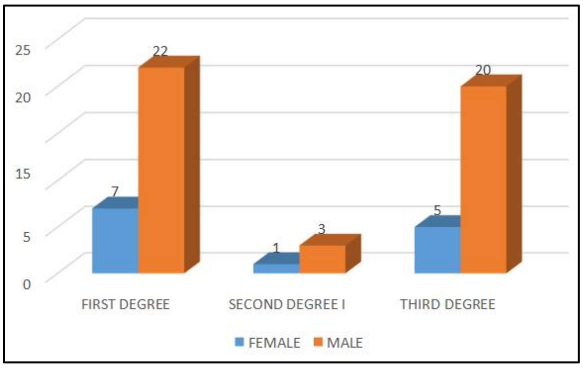

Fig.3. AV Blocks in males and females

A total of 121 (63%) patients had STEMI, and 71 (37%) had NSTEMI. AV blocks were more prevalent in STEMI patients than in NSTEMI patients. First-degree AV block was relatively similar between both groups, but third-degree AV block was significantly more frequent in STEMI patients (27 cases) compared to NSTEMI patients (2 cases). Mobitz Type I was observed more frequently in STEMI than in NSTEMI but remained low in both, in Fig. 4.

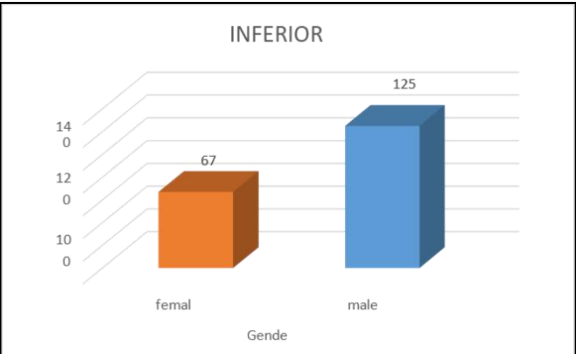

Fig.4. Inferior MI in males and females

On a gender basis, out of 192 patients, among male patients, 85 had STEMI and 44 had NSTEMI, while among female patients, 36 had STEMI and 27 had NSTEMI. The incidence of STEMI was higher in males, whereas NSTEMI cases were more balanced between genders in Fig. 5.
The study found that inferior MI was more common in males than females, aligning with broader epidemiological trends in cardiovascular diseases. Third-degree AV block is significantly more common in STEMI patients (27 patients) compared to NSTEMI (2 patients). First-degree AV block is relatively similar in both groups. Mobitz Type 1 is seen more frequently in STEMI than NSTEMI but remains low in both.

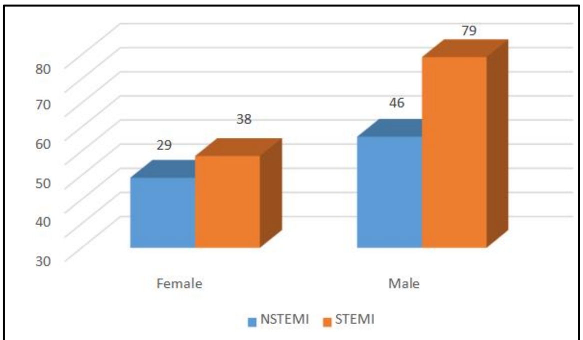

Fig.5. STEMI and NSTEMI in males and females

DISCUSSION

The findings of the present study are in line with previous research on the occurrence and traits associated with atrioventricular (AV) blockages among those with inferior wall myocardial infarction. AV blockages continue to be an ongoing issue in patients with inferior MI, related to the atrioventricular node's blood supply being dependent on the right coronary artery. In our investigation, AV blockages were found in 30% of patients, with first-degree blocks being the most common, followed by third-degree blocks. No known cases of second-degree Mobitz Type II AV block were identified (8).

The prevalence of first-degree AV blocks in our study is consistent with prior research findings, which indicate that ischemia injury to the AV node impairs conduction rather than fully blocking it in the early stages. First-degree AV blocks are often less severe and often temporary; however, their existence may signal underlying myocardial injury and a possible development to more severe blockages if ischemia continues(9).

Third-degree AV blocks, the second most common form in our analysis, indicate a more severe interruption in the cardiac conduction system. These blocks are frequently linked with significant myocardial damage, especially in the event of proximal RCA blockage. The absence of second-degree Mobitz Type II AV blockages in our sample is remarkable, as this type is less common in inferior MI and more commonly seen in anterior MI, where the left anterior descending (LAD) artery is implicated (10)(11).

Our findings also revealed a strong gender gap in the incidence of inferior MI and accompanying AV blockages, with males being particularly affected. This is consistent with global statistics showing that males are more likely to develop ischemic heart disease (IHD) and its consequences as a result of a combination of genetic predisposition, hormonal impacts, and increased exposure to risk factors such as smoking and hypertension. Females with AV blocks had somewhat greater incidence of severe AV blockages, which could be attributed to a late diagnosis or changes in symptom appearance (12).

When comparing STEMI and NSTEMI subgroups, STEMI patients exhibited a higher frequency of AV blocks across all types. This observation underscores the greater extent of myocardial damage in STEMI cases, where complete coronary artery occlusion leads to more severe ischemic injury. NSTEMI patients, while still at risk, typically experience partial occlusion and less extensive myocardial necrosis, explaining the lower frequency and severity of AV blocks in this group.

The results of our study are consistent with those of Ramzan et al., who observed a high prevalence of AV blocks in inferior MI patients, with third-degree blocks being more common. However, their reported frequency of complete heart block was significantly higher than in our study. This discrepancy could be attributed to differences in study populations, inclusion criteria, and regional variations in healthcare infrastructure and patient management (13).

Similarly, Gupta et al. reported a higher mortality rate and greater complications among patients with AV blocks compared to those without. Their study emphasized the critical role of early detection and management of AV blocks, including the timely use of temporary pacemakers in patients with symptomatic bradycardia(14).

Lastly, there were some limitations of our study; the study included only 192 patients, which might not fully represent the broader population. The study was conducted over a short period (4 months), limiting long-term observation. Certain confounding factors such as comorbidities, medication history, and genetic predisposition, were not fully analyzed.
For the future, using advanced imaging and electrophysiological studies to identify subtle conduction abnormalities could be best option. Public health initiatives to address modifiable risk factors (e.g., hypertension, diabetes, smoking) should be prioritized. Longer observation periods are needed to understand long-term outcomes and progression

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