ORIGINAL ARTICLE

COMPLETE HEART BLOCK IN PATIENTS PRESENTING WITH ACUTE ANTERIOR WALL MYOCARDIAL INFARCTION

Muhammad Ali Khan[1], Kinza Sammar[2], Raisa Naz[3], Shazia Tauqeer[3], Maria Shafiq[3], Shabana Naz[4]

[1]Department of Cardiology, [3]Department of Physiology, [4]Department of Pathology, Ayub Medical College Abbottabad-Pakistan. [2]Department of Physiology, Abbottabad International Medical College Abbottabad-Pakistan

Background: Complete heart block (CHB) is a relatively common complication in post-acute myocardial infarction (AMI) patients. Data on the incidence and consequences of CHB in patients with ST-segment elevation myocardial infarction (STEMI) are limited. Besides serving as an indicator of widespread myocardial injury, the development of CHB in STEMI is also associated with a higher risk of sudden cardiac death. Although there has been an observed increase in the incidence of CHB complicating STEMI over the past few decades, attributed to improved reporting and timely diagnosis, the absolute or true incidence of CHB in STEMI patients receiving current management is underestimated. The present study aimed to determine the frequency of complete heart block in patients presenting with acute anterior wall myocardial infarction (AWMI). **Methods:** This was a descriptive study conducted in the Cardiology Department of Ayub Teaching Hospital, Abbottabad, from February to July 2020. All patients (N=244) presenting with acute Anterior Wall ST-segment elevation Myocardial Infarction were included, with ages ranging from 20 to 80 years and both genders (males and females) considered. **Results:** The mean age of the patients was 55.98±12.224, ranging from 20 to 80 years, out of a total of 244 patients. In terms of gender distribution, there were 160 (65.6%) males and 84 (34.4%) females. Regarding the frequency of smokers, 63 (25.8%) were smokers, and 181 (74.2%) were non-smokers. The frequency of complete heart block was 8 (3.3%), while 236 (96.7%) did not have acute anterior wall myocardial infarction-associated heart block. **Conclusion:** Patients admitted with inferior wall MI and right ventricular (RV) infarction were at an increased risk of mortality. The high incidence of heart block in AWMI suggests that underlying infarction and tissue damage may be extensive, leading to increased mortality secondary to complete cardiac failure.

Keywords: Complete heart block (CHB); Acute anterior wall myocardial infarction (AWMI).

Citation: Khan MA, Sammar K, Naz R, Tauqeer S, Shafiq M, Naz S. Complete heart block in patients presenting with acute anterior wall myocardial infarction. J Ayub Med Coll Abbottabad 2024;36(2):310–5.

DOI: 10.55519/JAMC-02-13024

INTRODUCTION

A heart attack, universally known as Myocardial Infarction (MI), commonly occurs when the blood flow to a part of the heart diminishes or stops, causing extensive damage to the heart tissues. The most common presenting symptoms include chest pain or distress, which may radiate to the left arm, shoulder, neck, back, face, or jaw. Chest pain often originates in the center of the chest or more on the left side and lasts for more than a few minutes.[1] Most myocardial infarctions occur secondary to coronary artery disease (CAD). Risk factors for CAD include male sex, old age, hypertension, smoking, diabetes, lack of exercise, dyslipidaemia, obesity, improper diet, excessive alcohol consumption, and a positive past and family history. Many risk factors for MI are potentially modifiable and indicate CAD, the primary cause of MI. The Framingham Heart Study includes all risk factors for CAD in risk factor stratification scores. Chest pain may be accompanied by nausea or vomiting, fainting, and sweating. Some symptoms may occur without any chest pain, such as silent myocardial infarctions.[2] These cases are later discovered by electrocardiograms (ECG), elevated blood enzyme levels, or as incidental findings at autopsy after the person's death. Silent myocardial infarctions represent between 22% and 64% of all infarctions, being more frequently observed in the elderly, in association with diabetes mellitus, and after undergoing heart transplantation procedures.[1,3] In people with diabetes mellitus, differences in pain threshold, autonomic peripheral neuropathy, and various psychological factors have been mentioned as corresponding factors for the absence of symptoms.[1] In heart transplantation, the innervation of the donor heart is not fully developed and is replaced by the recipient's nervous system.[4,5] In women, the presentation of myocardial infarctions can be different. About 50% of women present with classic chest pain. The most common presenting symptoms of MI in women include weakness, fatigue, and shortness of breath. Sometimes, shortness of breath is the only presenting symptom, occurring often when damage to the heart limits the output of the left cardiac ventricle,

resulting in breathlessness either from low oxygen tension in the blood or as a consequence of pulmonary oedema.[6] Other associated symptoms may include light-headedness, weakness, hypotension, palpitations, and abnormalities in heart rate or rhythm. Women can also commonly experience back or neck pain, indigestion, heartburn, lightheadedness, shortness of breath, fatigue, nausea, or pain in the back of the jaw. These symptoms are often overlooked or mistaken for other medical conditions.[7] Other prominent risk factors for myocardial infarction include high levels of blood total cholesterol and low levels of high-density lipoprotein (HDL). High levels of total blood cholesterol, especially high levels of low-density lipoprotein (LDL), and high serum triglycerides are regular contributing factors. The rupture of a fully developed atherosclerotic plaque causing widespread blockage of a coronary artery is usually the underlying mechanism of MI. MIs are also caused by spasm of the coronary artery, secondary to the use of cocaine, significant emotional stress, and exposure to extremely cold temperatures.[6,7] A wide array of lab tests are available to confirm the diagnosis of heart block in MIs, such as ECGs, blood tests including enzymes and markers of inflammation and coronary damage, and coronary artery angiography.[6] The recording of the heart's electrical activity through an ECG may confirm an ST-segment elevation MI (STEMI) if the ST-segment is elevated. Frequently used blood tests include troponin T (Trop-T) and Troponin I (Trop-I), less often creatine kinase MB (CKMB).[8] The treatment of an AMI is critically dependent on early execution.[8] Aspirin is a suitable immediate treatment in the case of suspected MI. Nitro-glycerine and/or opioids are used to relieve severe chest pain; however, although effective remedies used in an emergency, they do not improve the overall MI outcomes.[6–8] Supplemental oxygen therapy is endorsed in patients with low oxygen levels or presenting with dyspnoea.[9] AMI is associated with a large number of complications, including arrhythmias due to conduction disturbances.[8] The most commonly observed conduction defect after Acute Myocardial Infarction (AMI) is Atrioventricular (AV) blocks.[10] In acute anterior wall myocardial infarction (AWMI), 1st degree AV block is found in 0.2%, 2nd degree AV block is present in 0.2%, and complete atrioventricular block (CAVB) is present in 2.6%. CAVB is more commonly present in acute Inferior wall MI (IWMI, 3.7–15%) than acute anterior wall MI (AWMI, 1-8%). Many studies have revealed that these conduction abnormalities are accompanied by an increased in-patient mortality rate. In cases of acute AWMI, these conduction abnormalities are less common but more serious, associated with higher short and long-term in-hospital mortality.[8,9] Patients with AWMI are at a greater risk of dying before discharging from the hospital than those with inferior or posterior wall MIs (11.3% vs. 7.7%). Complete heart block in patients with Myocardial Infarctions (MI) usually responds to atropine. In most patients, it resolves within a few days without the need for a temporary or permanent pacemaker.[11] ST-segment elevation myocardial infarction (STEMI) also increases the risk of 3rd degree AV block compared to patients with non-STEMI. One study found that 3rd degree AV block was present in 3.2% of cases of STEMI.[12] In a Pakistani study, it has been reported that high-degree or 3rd degree AV block occurs in 1.3% of cases of STEMI. In the "old days," it was said that although patients with inferior MI who developed AV block had poor in-hospital outcomes, the long-term prognosis was similar regardless of its occurrence, even for those with CHB.[13] However, patients with Anterior MI and CHB did not fare as well in the past or today.[14] Permanent pacing is the routine treatment for irreversible third-degree and advanced second-degree atrioventricular (AV) block. Although necessary and effective in most patients with such conditions, the implantation of a permanent pacemaker is costly. Previous studies conducted on the western population showed that CHB in the setting of acute AWMI is life-threatening and can save lives if acted upon promptly.[15,16] Genetically, we are quite different from the western population.[17] Therefore, this study will help us determine the frequency of CHB in patients with acute AWMI in our hospital, guiding us to allocate sufficient resources to avert its disastrous effects in our population. Therefore, we conducted this study to determine the exact frequency of 3rd degree AV blocks (CHB) in Acute AWMI and their mortality in our setup.

MATERIAL AND METHODS

The study was a descriptive study conducted in the Cardiology unit of Ayub Teaching Hospital, Abbottabad (ATH), from February to July 2020. ATH is a 1000-bedded hospital consisting of fully-fledged medical and surgical units. The Department of Cardiology has 100 beds divided into two units, A and B. The study population included 244 patients who presented with acute anterior wall myocardial infarction (AWMI). The sample size was calculated using the WHO software for sample size calculation with the following assumptions: Confidence interval =95%, Anticipated proportion of complete heart block (CHB) in acute anterior wall myocardial infarction as 2.6%, and absolute precision of 2.0%. The sampling technique used was consecutive non-probability sampling. All patients aged between 20 to 80 years, of either gender (males and females), who presented with acute Anterior Wall Myocardial Infarction (AWMI) were included in the study, as per the operational definition. Patients with myocardial infarction other than Anterior Wall Myocardial Infarction (AWMI), those with renal failure, either hyper or hypokalaemia, and those with a history of cardiac valve replacement and coronary artery bypass grafting (CABG) were excluded from the study. After obtaining approval

from the hospital ethics committee, patients fulfilling the sample selection criteria were included in this study after obtaining fully informed written consent, and were assured about the confidentiality of their personal data. Detailed medical history was taken from the patients. Serum Troponin, CKMB, and CPK were sent to the pathology laboratory of Ayub Teaching Hospital, Abbottabad. The data obtained were recorded on a proforma. Data collected were analyzed using SPSS version 20.0. Mean±SD was calculated for quantitative variables like age. Percentage and frequencies were computed for categorical variables like gender, BMI, diabetes, hypertension, and co-morbidities, e.g., CHB. The outcome variable was stratified by gender and co-morbidities. The chi-square test was used at a 5% significance level.

RESULTS

Data collected were analyzed using SPSS version 20.0. Mean ± SD were calculated for quantitative variables like age, while percentages and frequencies were computed for categorical variables such as gender, BMI, diabetes, hypertension, and co-morbidities (e.g., CHB). The outcome variable was stratified by gender and co-morbidities, and the Chi-square test was employed at a 5% significance level. All results were presented in tables and graphs. A total of 244 patients were included in the study to determine the frequency of complete heart block (CHB) in patients presenting with acute anterior wall myocardial infarction (AWMI). Descriptive statistics revealed that the mean age of the patients was 55.98±12, ranging from 20 to 80 years (Table 1). The gender distribution showed 160 (65.6%) males and 84 (34.4%) females out of the total 244 patients (Table 1). Regarding smoking habits, 63 (25.8%) were smokers, and 181 (74.2%) were non-smokers (Table-1). Other categorical variables, such as hypertension, obesity, and diabetes, were also presented (Table-1). Specifically, 74 (30.3%) patients were hypertensive, 81 (33.2%) were obese, and 58 (23.8%) were diabetics.

Concerning the main outcome variable, 8 (3.3%) patients presented with complete heart block, while 236 (96.7%) showed no acute anterior wall myocardial infarction heart block (Table-1). In-hospital mortality was observed in 37 (15.2%) male patients and 26 (10.7%) female patients. Stratification of in-hospital mortality with respect to various factors, including smoking, diabetes, BMI, and hypertension, was conducted, and the statistical significance of the findings was reported (Table-2). Notably, the stratification of complete heart block with respect to in-hospital outcome (expired) showed a statistically significant finding (p=0.016) (Table-2).

Table 1: Frequency of various physiological and Descriptive statistics of study population (n=244)

Parameter	Frequency	Percentage
Male	160	65.6
Female	84	34.4
Total	244	**100**
Smoking		
Yes	63	25.8
No	181	74.2
Total	244	**100**
Hypertension		
Yes	74	30.3
No	170	69.7
Total	244	**100**
BMI		
Obesity	81	33.2
No Obesity	163	66.8
Total	244	**100**
Diabetes:		
Yes	58	23.8
No	186	76.2
Total	244	**100**
Complete heart block		
Yes	8	3.3
No	236	96.7
Total	244	**100**
In-hospital outcome (expired):		
Yes	63	25.8
No	181	74.2
Total	244	100

Table-2: Stratification of in-hospital outcome (expired) with respect to various physiological and Descriptive statistics of study population (n=244)

Parameter		In hospital outcome (Expired)		Total	p-value
		Yes	No		
Gender	**Male**	37 15.2%	123 50.4%	160 65.6%	
	Female	26 10.7%	58 23.8%	84 34.4%	
Total		63 25.8%	181 74.2%	244 100%	**0.184**
Smoking	**Yes**	22 9.0%	41 16.8%	63 25.8%	
	No	41 16.8%	140 57.4%	181 74.2%	
Total		63 25.8%	181 74.2%	244 100%	**0.055**
Diabetes	**Yes**	14 5.7%	44 18.0%	58 23.8%	
	No	49 20.1%	137 56.1%	186 76.2%	
Total		63 25.8%	181 74.2%	244 100%	**0.737**
BMI	**Obesity**	19 7.8%	62 25.4%	81 33.2%	
	No Obesity	44 18.0%	119 48.8%	163 66.8%	
Total		63 25.8%	181 74.2%	244 100%	**0.552**
Hypertension	**Yes**	18 7.4%	56 23%	74 30.3%	
	No	45 18.4%	125 51.2%	170 69.7%	
Total		63 25.8%	181 74.2%	244 100%	**0.725**
Complete heart block	**Yes**	5 2.0%	3 1.2%	8 3.3%	
	No	58 23.8%	178 73.0%	236 96.7%	
Total		63 25.8%	181 74.2%	244 100%	**0.016**

DISCUSSION

A myocardial infarction (MI) occurs as a consequence of atherosclerotic plaque buildup in the endometrial lining of the coronary artery, leading to abrupt plaque rupture and calamitous thrombus formation. This results in complete artery occlusion, impeding blood flow downstream. Prolonged compromised blood flow triggers the ischemic cascade, causing infarction of heart muscle cells within the blocked coronary zone. This initiates an intracellular cascade involving necrosis and subsequent apoptosis, commencing within 15–30 minutes of coronary blood supply occlusion.[1–3] The initial infarction cascade unfolds over the subsequent 3–4 hours, with changes manifested in gross pathology. Notably, these changes cannot be predicted by the absence or presence of Q-waves on an ECG record at that time.[4–6]

Subsequent tissue death and scarring modify normal conduction pathways, grossly weakening affected areas. The precise size and location of the MI expose individuals to risks such as abnormal heart rhythms (arrhythmias), heart block (CHB), ventricular aneurysms, post-infarction myocarditis, and heart wall rupture with catastrophic consequences.[5–7] Recording an electrocardiogram (ECG) plays a crucial role in the early assessment of an acute MI. These ECGs are frequently taken over minutes to hours, based on changes in signs or symptoms, reflecting altered electrical characteristics of infarcted tissue. Arrhythmias, common in ischemia, may lead to complete heart block (CHB) in the heart's electrical conduction system. Notably, significant risk factors, including CHB and the anterior location of the infarct, have been identified for increased risk of recurrent cardiac events and mortality after acute MI.[11]

This study included 244 patients to ascertain the frequency of CHB in those presenting with acute anterior wall myocardial infarction (AWMI), adhering to operational definitions and inclusion criteria. Despite advancements in MI diagnosis and management, it remains a significant public health challenge in developing countries.[8] Conduction issues, particularly atrioventricular blocks (AVB) in anterior-wall MI, have demonstrated elevated in-hospital and long-term mortality.[12] The observed mortality associated with complete heart block in anterior wall myocardial infarction, with or without prior right bundle-branch block and/or left fascicular block, is notably high.[13] Multivariate analysis identified age, male sex, presence in health region four, and comorbidities like hypertension and diabetes as risk factors for acute MI.[14] In this study, the mean age was 55.98±12.224, with 65.6% males and 34.4% females. Distinct lifestyles and behavioral patterns between genders, such as smoking habits, predispose males to higher cardiovascular risks.[15] The study revealed 25.8% smokers and 74.2% non-smokers, 30.3% hypertensive and 69.7% normotensive patients, 33.2% obese and 66.8% not obese individuals, and 23.8% diabetics and 76.2% non-diabetics [Table-1]. Of the total, 3.3% presented with complete heart block, while 25.8% experienced in-hospital expiries and 74.2% were managed [Table-1].

These findings align with a study conducted by Hashim M, *et al*.[18] The stratification of in-hospital mortality by gender showed 15.2% in-hospital mortality in male patients and 10.7% in female patients, not statistically significant (p=0.184). This is consistent with results from Hashim M, *et al*.[13] Stratification by smoking habits revealed 9.0% in-hospital mortality in smokers and 16.8% in non-smokers, with no statistical significance (p=0.055), as seen in another study.[13] Prevalence of MI increases in patients with potential risk factors such as diabetes, obesity, dyslipidaemia, and smoking.[19] The study revealed no significant stratification of in-hospital mortality by diabetes (p=0.737), BMI (p=0.552), or hypertension (p=0.725). Conduction defects complicating acute myocardial infarction are frequently associated with increased morbidity and mortality.[13] CHB and hypertensive emergencies refractory to medical treatments distinctly improve following complete heart block treatment with permanent pacemaker implantation.[22]

Coronary artery disease is a major cause of Complete Heart block (CHB) and hemiblocks, documented complications of acute myocardial infarction (AMI) and markers for high mortality and morbidity. Understanding physiological mechanisms in CHB development in AMI is crucial for detecting and managing potentiating complications.[23] The study's stratification of in-hospital mortality by complete heart block showed 2.0% mortality in complete heart block cases and 23.8% in other co-morbidities, statistically significant at p=0.016, in line with other investigations.[20,21] Anterior wall MI associated with bradycardia or heart block is a poor prognostic sign.[22] In a study, the incidence of complete Atrioventricular block among patients with inferior wall MI was twice as high compared to patients with an anterior wall MI, affecting in-hospital morbidity and mortality.[25] These findings align with another study establishing a better

prognosis for patients with inferior wall MI than those with anterior wall MI, despite similar myocardial damage, suggesting that the MI location may independently affect disease prognosis.[26]

The occurrence of heart block in MI indicates widespread infarction and may result in complete cardiac failure or death. The strength of the study is that data was collected employing rigour and a relatively appropriate sample size. Data of such patients over a longer duration of time in many centres would have given more strength to this study. But nonetheless it alludes towards the different outcomes as given in the results.

CONCLUSION

Patients admitted with inferior wall MI and right ventricular (RV) infarction face increased mortality risks. Complete heart block is more common in older men. ECG findings comprising AV block and ST-segment elevation without discernible structural heart disease indicate a higher risk of sudden death. Timely detection, resource allocation, and treatment are crucial to mitigate adverse outcomes.

AUTHORS' CONTRIBUTION

MAK: Conceptualization, study design and plan execution, Setting of guidelines for article. KS: Study design, data collection and analysis, literature search. RN: Final appraisal, Critical appreciation and proof reading. ST: Write up of the article, literature review Critical appraisal and proof reading. MS: Data analysis, review of article, literature search. SN: Data collection, critical analysis and review, with valuable recommendations about write up of article.

REFERENCES

1. Adam AM, Rehan A, Waseem N, Iqbal U, Saleem H, Ali MA, *et al*. Prevalence of Conventional Risk Factors and Evaluation of Baseline Indices Among Young and Elderly Patients with Coronary Artery Disease. J Clin Diagn Res 2017;11(7):OC34.
2. Bally M, Dendukuri N, Rich B, Nadeau L, Helin-Salmivaara A, Garbe E, *et al*. Risk of acute myocardial infarction with NSAIDs in real world use: bayesian meta-analysis of individual patient data. BMJ 2017;357:j1909.
3. Cardoso R, Alfonso CE, Coffey JO. Reversibility of High-Grade Atrioventricular Block with Revascularization in Coronary Artery Disease without Infarction: A Literature Review. Case Rep Cardiol 2016;2016:1971803.
4. Hameed DN, Shabbir DM, Khadim DR, Khattak DT, Khan DZ, Aziz DZ, *et al*. Comparison of in-hospital mortality in patients with ST elevation myocardial infarction with and without 3rd degree AV block. Pak Armed Forces Med J 2019;69(Suppl 1):S123–7.
5. Ibanez B, James S, Agewall S, Antunes MJ, Bucciarelli-Ducci C, Bueno H. *et al*. 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: the Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). Eur Heart J 2018;39:119–77.
6. Fan X, Maharjan P, Liu P, Bai L. Effect of primary PCI on the recovery of atrioventricular block in inferior STEMI patients with late presentation (>12 hours): insights from a single center 10-year experience. J Investig Med 2020;68(5):1011–4.
7. Mehta LS, Beckie TM, DeVon HA, Grines CL, Krumholz HM, Johnson MN, *et al*. Acute Myocardial Infarction in Women A Scientific Statement From the American Heart Association. Circulation 2016;133(9):916–47.
8. Kusumoto FM, Schoenfeld MH, Barrett C, Edgerton JR, Ellenbogen KA, Gold MR. *et al*. 2018 ACC/AHA/HRS Guideline on the evaluation and management of patients with bradycardia and cardiac conduction delay: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines, and the Heart Rhythm Society. J Am Coll Cardiol 2019;74(7):932–87.
9. Abuzaid A, Fabrizio C, Felpel K, Al Ashry HS, Ranjan P, Elbadawi A, *et al*. Oxygen Therapy in Patients with Acute Myocardial Infarction: A Systemic Review and Meta-Analysis. Am J Med 2018;131(6):693–701.
10. Namana V, Gupta SS, Abbasi AA, Raheja H, Shani J, Hollander G. Right ventricular infarction. Cardiovasc Revasc Med 2018;19(1 Pt A):43–50.
11. Kumar V, Sinha S, Kumar P, Razi M, Verma CM, Thakur R, *et al*. Short-term outcome of acute inferior wall myocardial infarction with emphasis on conduction blocks: a prospective observational study in Indian population. Anatol J Cardiol 2017;17(3):229–34.
12. Sakboonyarat B, Rangsin R. Prevalence and associated factors of ischemic heart disease (IHD) among patients with diabetes mellitus: a nation-wide, cross-sectional survey. BMC Cardiovasc Disord 2018;18(1):151.
13. Hashmi KA, Shehzad A, Hashmi AA, Khan A. Atrioventricular block after acute myocardial infarction and its association with other clinical parameters in Pakistani patients: an institutional perspective. BMC Res Notes 2018;11(1):329.
14. Afreen A, Khan MN, Khan MB, Ahmad A, Akbar MS, Danyal SM. S82 risk factor assessment in patients undergoing coronary angiography at army cardiac centre Lahore. Pak Armed Forces Med J 2019;69(Suppl 1):82–6.
15. Rashid NA, Nawi AM, Khadijah S. Exploratory analysis of traditional risk factors of ischemic heart disease (IHD) among predominantly Malay Malaysian women. BMC Public Health 2019;19(Suppl 4):545.
16. Aguiar RS, Timóteo AT, Ferreira L, Carvalho R, Oliveira M, Cunha P, *et al*. Complete atrioventricular block in acute coronary syndrome: prevalence, characterization and implication on outcome. Eur Heart J Acute Cardiovasc Care 2018;7(3):218–23.
17. Kristian T, Joseph AS. Fourth universal definition of myocardial infarction. Eur Heart J 2018;40(3):237–69.
18. Hashim M, Zeb S, Shah GA, Rizvi SNH. In-hospital mortality in patients of ST-elevation MI. Pak Heart J 2017;50(4):241–7.
19. Linssen PBC, Veugen MGJ, Henry RMA, van der Kallen CJH, Kroon AA, Schram MT, *et al*. Associations of (pre)diabetes with right ventricular and atrial structure and function: the Maastricht study. Cardiovasc Diabetol 2020;19(1):88.
20. Gorter TM, Streng KW, van Melle JP, Rienstra M, Dickinson MG, Lam CSP, *et al*. Diabetes mellitus and

right ventricular dysfunction in heart failure with preserved ejection fraction. Am J Cardiol 2018;121(5):621–7.
21. Chapman AR, Lee KK, McAllister DA, Cullen L, Greenslade JH, Parsonage W, *et al*. Association of High-Sensitivity Cardiac Troponin I Concentration With Cardiac Outcomes in Patients With Suspected Acute Coronary Syndrome. JAMA 2017;318(19):1913–24.
22. Choudhury M, Kumar N, Chalil S, Abozguia K. Refractory hypertensive emergency associated with complete heart block resolved after permanent pacemaker implantation: A case report. Clin Case Rep 2022;10(6):e5964.
23. Lévy S. Bundle branch blocks and/or hemiblocks complicating acute myocardial ischemia or infarction. J Interv Card Electrophysiol 2018;52(3):287–92.
24. Kubra G, Saghir T, Rasheed S, Rehan FH, Ali A, Abbas S. In-Hospital Outcomes of Female Patients With Inferior Wall Myocardial Infarction. Cureus 2021;13(2):e13274.
25. Khan M, Khan IA, Samore NA, Kamran J, Janjua AF, Mustafa A, *et al*. Clinical outcome of patients admitted with acute anterior versus acute inferior wall myocardial infarction. Pak Armed Forces Med J 2021;70(Suppl-4):S892–6.
26. Ullah Z, Khan I, Khan W, Khan MA. Frequency of Complete Heart Block in Patients with Acute Inferior Wall Myocardial Infarction. Pak J Med Health Sci 2022;16(5):89–90.

Submitted: March 1, 2024	*Revised: April 23, 2024*	*Accepted: April 23, 2024*

Address for correspondence:

Dr. Raisa Naz, Associate Professor Department of Physiology, Ayub Medical College, Abbottabad-Pakistan.
Cell: +92 300 911 2050
Email: raisakhan660@gmail.com