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Original Research Article

Conduction Block in Acute Myocardial Infarction: A Prospective Observational Study at JLNMCH, Bhagalpur, Bihar

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Abstract

Background: After an acute MI, several conduction blockages manifest. Several significant electrical anomalies, such as heart blocks including atrioventricular and interventricular blocks, are brought on by acute myocardial infarction. Increased vagal tone or a pathogenic mechanism, with differing occurrence rates in various populations, can both produce delayed conduction. Acute myocardial infarction continues to be a major source of morbidity and mortality in both industrialised and developing nations. It may happen at either the atrioventricular or interventricular levels of the conduction system. It could be temporary or ongoing.

Methods: From September 2021 to August 2022, patients who were diagnosed with ST segment elevation myocardial infarction and acquired conduction blocks were admitted to the wards and ICU at the JLNMCH, Bhagalpur, Bihar. This prospective observational study was conducted there. The present study included a total of 140 patients who were admitted to wards and ICU.

Results: The current study included a total of 140 patients with ST segment elevation myocardial infarction. Men made up 98 (70%) and women made up 42 (30%) of the ST segment elevation myocardial infarction patients. Men had significantly more infarctions with elevated ST segments than women (p=0.001).

Conclusion: Individuals with ST segment elevation myocardial infarction may experience a variety of consequences, including ventricular arrhythmias, conduction blocks, ventricular dysfunction, and cardiogenic shock. Patients with ST segment elevation myocardial infarction have a poor prognosis for developing these consequences.

Keywords: Ischaemia, Mycordium, Catecholamines, Hypoxia.

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Introduction

Cardiac conduction block is one of the serious adverse effects of ST segment elevation myocardial infarction. In a cardiac conduction block, the cardiac impulse is either delayed or halted. Patients with ST segment elevation myocardial infarction experience cardiac conduction block as a result of the following physiological changes.

1. Ischemia altering the tissues around the sinoatrial node and AV connections structurally, either temporarily or permanently.
2. A rise in parasympathetic activity that is frequently linked to an inferior wall myocardial infarction.
3. A rise in extracellular potassium, which slows the conduction of cardiac impulses.
4. Slower impulse conduction across the AV node due to local adenosine release and metabolite production from adenosine triphosphate breakdown.

With ST segment elevation myocardial infarction, several conduction blockages manifest. In between 4 and 14% of patients with ST segment elevation myocardial infarction, first-degree AV block is seen. Mobitz type I second-degree AV block, which is transitory in nature, is seen in around 10% of patients with ST segment elevation myocardial infarction. 1% of individuals with ST segment elevation myocardial infarction had Mobitz type II second-degree AV block [2]. Between 5–8% of patients develop a third-degree or total heart block [3]. Because to the widespread nature of the infarction, the development of full AV block is linked to a poor prognosis [2,3]. The prognosis is poor for bundle branch block in ST segment elevation myocardial infarction. This is linked to both the frequency of ventricular asystole and the degree of myocardial injury [4,5]. Conduction block development makes ST segment elevation myocardial infarction worse off. Understanding the many types of conduction blocks that can happen during a ST segment elevation myocardial infarction can aid with early detection of conduction blocks and the implementation of temporary or permanent pacing if needed.

This study is being done to better understand the different types of conduction blocks that might develop in different ST segment elevation myocardial infarction patients and the consequences for prognosis in JLNMCH, Bhagalpur, Bihar.

Material and Methods

From September 2021 to August 2022, a prospective, observational study was conducted in the department of medicine at the Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, on patients who had been admitted to the wards and intensive care unit and had been diagnosed with a ST segment elevation myocardial infarction and had experienced conduction blocks.

The current study included 140 patients who were admitted to wards and ICU in total. According to WHO guidelines, ST segment elevation myocardial infarction (STEMI) is defined as the presence of at least two of the following three factors: This study comprised patients with a typical history of chest pain lasting longer than 30 minutes, classic ECG abnormalities indicative of acute MI, and high cardiac enzyme levels of CPK MB and troponin I.

This study excluded patients with longstanding bundle branch blocks, cardiomyopathy, congenital or rheumatic heart disease, and a history of taking medicines like clonidine, methyldopa, verapamil, digoxin, etc. that cause conduction blocks. Each participant in the trial received a patient information sheet and a thorough explanation of the process. Each time informed written consent was obtained.

The presence of risk factors, their duration, and any other pertinent information were all carefully recorded in the history of the chest pain. Also, a thorough history was gathered on the use of various drugs. For the study of cardiac enzymes, blood glucose, lipid profile, renal function test, and regular blood tests, a random venous blood sample was taken.

An increase in creatine kinase enzyme and its myocardial band (MB) fraction to more than twice the upper limit of normal, high troponin levels, ST-segment elevation of at least one millimetre in at least two of the limbs leads, and prolonged chest discomfort were utilised to make the diagnosis of STEMI. All patients were monitored after being admitted to the ICU, and particular focus was placed on looking for signs of conduction block. During an average of 48 hours, continuous electrocardiographic monitoring was carried out. On entering the intensive care unit, a standard 12-lead ECG was recorded at a paper speed of 25 mm/s and an amplification of 10 mm/mV. ECG criteria for the STEMI diagnosis: With the exception of leads V2-V3, where the following cut points apply: ≥0.2 mv in males 40 years, ≥0.25 mv in men ≥40 years, and ≥0.15 mv in women, new ST elevation at J-point in two contiguous leads with cut points: ≥0.1 mv in all leads.

Based on distinctive ECG abnormalities, the following conduction block diagnoses were made: Mobitz Type I, Mobitz Type II, Third-degree or total AV block, left anterior Hemi block (LAHB), Left posterior Hemi block (LPHB), LBBB, and RBBB are examples of AV blocks of the first and second degrees, respectively.

Statistical Package for Social Science (SPSS) version 21 for Windows was used for the statistical analysis. For continuous variables, data were presented as mean values ±standard deviations (SD). Categorical variables were presented in terms of frequency and percentage. A p-value of <0.05 or lower was regarded as statistically significant.

Results

The current study included a total of 140 patients with ST segment elevation myocardial infarction. Men made up 98 (70%) and women made up 42 (30%) of the ST segment elevation myocardial infarction patients. Men had significantly more infarctions with elevated ST segments than women (p=0.001).

Table No. 1 shows the frequency distribution of ST segment elevation MI patients by gender.

Table 1: ST segment elevation myocardial infarction patients frequency distribution by gender

Gender	Number (n=140)	Percentage
Male	98	70.0%
Female	42	30.0%
Total	140	100.0%
(*p* value=0.001)		

The current study looked at how conduction blocks were distributed across various ST segment elevation myocardial infarction sites. The majority of myocardial infarctions with ST segment elevation occurred in the anterior wall (n=54). These 54 patients had a total of 18 first-degree heart blocks, 14 Mobitz type 2 AV heart blocks, 12 right bundle branch blocks, 6 complete heart blocks, 2 left bundle branch blocks, and the remaining 2 Mobitz type 1 AV heart blocks.

Table 2: Conduction block distribution across different ST segment elevation myocardial infarction sites

	Total No. of conduction	Types of conduction block							
Site		CHB	First Degree Hb	LAHB	LBBB	Mobitz Type 1	Mobitz Type 2	RBBB	Trifascicular Blok
Anterior Wall MI	54	6	18	-	2	2	14	12	-
Anteroinferior wall MI	2	2	-	-	-	-	-	-	-
Anterolateral wall MI	10	-	-	-	2	-	6	2	-
Anteroseptalwall MI	6	2	-	-	-	2	2	-	-
Inferoposteriorwall MI	4	2	-	-	-	2	-	-	-
Inferior wall MI	48	8	18	-	4	10	4	0	1
Lateral wall MI	16	2	4	2	6	-	2	2	-

There were 48 patients who had both inferior wall and ST segment elevation myocardial infarction. Of these 48 patients, 18 had first-degree heart blocks, 10 had AV heart blocks of Mobitz type 1 or 2, 8 had full heart blocks, 4 had left bundle branch blocks, and the other 4 had AV heart blocks of Mobitz type 2.

There were 16 patients who had both lateral wall and ST segment elevation myocardial infarction. 16 patients had left bundle branch blocks in six, first-degree heart blocks in four, complete heart blocks in two, right bundle branch blocks in two, and left anterior hemiblocks in two of the patients. There were 10 patients who had anterolateral wall myocardial infarction in addition to ST segment elevation myocardial infarction. Six of those five patients, including two with left bundle branch blocks and two with right bundle branch blocks, had Mobitz type 2 heart blocks.

ST segment elevation myocardial infarction was present in 6 patients with anteroseptal wall myocardial infarction. Two of those six individuals each had a complete Mobitz type 1 AV or type 2 AV heart block.

Four patients had both an inferoposterior wall infarction and a ST segment elevation myocardial infarction. The other two of those four people had Mobitz type 1 AV heart blocks, whereas the other two had entire heart blocks. There were two patients with ST segment elevation myocardial infarction who also had anterior inferior wall infarction and complete cardiac block.

Table 3: Patients with ST segment elevation myocardial infarction are distributed according on symptoms

Symptoms	Sex		Total	Percentage
	Male	Female		
Chest pain	98	40	138	98.57%
Vomiting	40	12	52	37.14%
Sweating	96	38	134	95.71%
Dyspnea	50	20	70	50.00%
Palpitation	22	16	38	27.14%

Discussion

In the current study, patients with ST segment elevation myocardial infarction reported experiencing a variety of symptoms, including chest pain (98.57%), sweating (95.71%), dyspnea (50%), vomiting (37.14%), and palpitation (27.14%). Chest discomfort and perspiration were the most typical symptoms.

According to a study by Chandrashekar and Path *et al*., chest pain was the most common complaint overall, being reported by 193 (98.4%) patients without blocks and 29 (80.5%) patients with blocks [6]. The next two typical signs were giddiness and nausea. Patients with CB experienced greater rates of dyspnea, palpitations, nausea, and giddiness, which was statistically significant.

The most frequent risk factor identified in the current investigation was hypertension, which was present in 54 (38.57%) of patients with ST segment elevation myocardial infarction. Males made up 30% more of the hypertension patients than females (8%). The second risk factor was diabetes mellitus, which was found in 27.14% (n=38) of those with ST segment elevation myocardial infarction. 21.43% (n=30) of individuals with ST segment elevation myocardial infarction had smoking as a third risk factor. The smokers were all male patients. Cerebrovascular accident was a risk factor in only 2 ST segment elevation myocardial infarction patients, both of whom were female.

In the study by Ratan Ram *et al* [7], several risk factors, such as hypertension, diabetes, IHD, and smoking were present in 27%, 25%, 13%, and 30% of cases, respectively. In research by Chavda *et al* [8], which yielded similar findings, smoking (72.0%) was identified as the primary risk factor, followed by IHD (14% of patients) and diabetes mellitus (10%). The prevalence of hypertension and diabetes mellitus was 22,3% and 20,2%, respectively, in the studies of Hreybe and Sab [9]. Males were shown to have higher rates of hypertension, IHD, and smoking when compared to females, whereas females had higher rates of diabetes.

Conclusion

Our study's findings showed that men were far more likely than women to experience ST segment elevation myocardial infarction. The two symptoms that ST segment elevation myocardial infarction patients reported experiencing the most commonly were chest discomfort and sweating.

In individuals with ST segment elevation myocardial infarction, anterior and inferior wall myocardial infarction were the two most common myocardial infarction sites. The two conduction blockages seen most commonly in the current analysis were first degree heart block and Mobitz type 2 AV block.

There was a significant mortality rate among those with complete heart blockages. As a result, a poor outcome in those with ST segment elevation myocardial infarction is predicted by the degree of conduction block. All patients with ST segment elevation myocardial infarction should be continuously monitored for the early conduction block diagnosis in order to improve the patient's prognosis.

References

1. Antman EM. ST-elevation myocardial infarction: Management. In: Zipes Douglas P. Libby Peter, Bonow Robert O, Braunwald Eugene (eds) – Braunwald‟s heart disease. 7th Edition: Elsevier Saunders. 2005;1195-1212.
2. Podrid PJ. Arrhythmias after acute myocardial infarction – Evaluation and

Management of rhythm and conduction abnormalities. Post-grad Med J. 1997; 102(5): 125-139.
3. Goldberg RJ, Zevallos JC, Yarzebski J, Alpert JS, Gore JM, Chen Z, *et al*. Prognosis of acute myocardial infarction complicated by complete heart block (The Worcester Heart Attack Study). Am J Cardiol. 1992; 69:1135-41.
4. Bauer GE, Julian DG, Valentine PA. Bundle branch block in acute myocardial infarction. Br Heart J 1965; 27: 724-730.
5. McNally EM, Bechimol A. Medical and physiological considerations in the use of artificial cardiac pacing, Part 1. Am Heart J. 1968; 75: 380-398.
6. Chandrashekar G, Pathi N. Conduction Blocks in Acute Myocardial Infarction: A Prospective Study. Int J Sci Stud. 2016;4(6):1-6.
7. Ram R, Devi KB, Chanu KJ, Devi T, Naorem S, Chongtham DS. Study of conduction blocks in acute myocardial infarction. J Med Soc. 2016; 30:149-52.
8. Chavda AB, Patel DS, Chatterjee SS. Clinical profile of conduction blocks in patients of acute myocardial infarction at tertiary care hospital, Jamnagar, Gujarat, India. IJSR. 2012; 1:102-3.
9. Hreybe H, Saba S. Location of acute myocardial infarction and associated arrhythmias and outcome. Clin Cardiol.. 2009; 32:274- 7.