

Study of Arrhythmias in subjects with Acute Myocardial Infarction

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Abstract

Background: Coronary artery disease (CAD) remains the leading cause of death in the industrialized world. Indians also show higher incidence, morbidity and mortality than other ethnic groups.¹ Many of these deaths are attributed to the development of arrhythmias during periods of myocardial infarction. **Objective:** To evaluate the incidence and profile of cardiac arrhythmias in acute myocardial infarction in the first 48 hours of hospitalization i.e. peri-infarction period and during first week of acute Myocardial infarction. **Methodology:** A hospital based cross sectional study was conducted for a period of 2 years from December 2017 to January 2019. 100 Acute myocardial infarction patients admitted to ICCU during this period were included in the study. Patients aged >18 years admitted in the ICCU with acute myocardial infarction were included in the study. Patients with preexisting Cardiac abnormalities such as previous MI, arrhythmias, cardiomyopathy were excluded from the study. **Results:** In our study nearly 48% had anterior wall MI, 26% had inferior wall MI, 10% had Inferolateral MI, 6% had Inferior wall + RV and 10% had Lateral wall and thrombolysis was done in 70% of subjects. In the study 72% had Arrhythmia, majority had arrhythmia at 1st hour (72.2%), majority had spontaneous termination of Arrhythmia (52.8%). Most common Arrhythmia among MI subjects was Sinus bradycardia (25%), followed by VPC (16.7%), 8.3% had 2nd degree heart block. **Conclusion:** Ventricular premature contraction was a second most common arrhythmia. However ventricular premature contractions also occurred along with other arrhythmias like first degree heart block, sinus bradycardia, sinus tachycardia, right bundle branch block and ventricular tachycardia. Arrhythmias are common during first 48 hours and plays a significant role in outcome of acute of myocardial infarction.

Keywords: Arrhythmia, Heart block, Coronary, Thrombolysis, Myocardial ischemia.

How to cite this article:

Ravindranath Reddy DR, Balachandra G, Ravi Shankar MS. Study of Arrhythmias in subjects with Acute Myocardial Infarction. J Cardiovasc Med Surg. 2020;6(1):33-37.

Introduction

Coronary artery disease (CAD) remains the leading cause of death in the industrialized world. Indians also show higher incidence, morbidity and mortality

than other ethnic groups.¹ Many of these deaths are attributed to the development of arrhythmias during periods of myocardial infarction.

A considerable number of patients with acute myocardial infarction have several cardiac rhythm abnormalities, approximately twenty-five percent have cardiac conduction disturbance within 24 hours following infarct onset. More or less any rhythm disturbance can be associated with acute myocardial infarction, including bradyarrhythmias, supraventricular tachyarrhythmias, ventricular arrhythmias, and atrio ventricular block. With

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Received on 19.01.2020

Accepted on 04.02.2020

the advent of thrombolytic therapy, some rhythm disturbances in patients with acute myocardial infarction may be related to coronary artery reperfusion.²

The objective of this study is to evaluate the incidence and profile of cardiac arrhythmias in acute myocardial infarction in the first 48 hours of hospitalization i.e. peri-infarction period and during first week of acute Myocardial infarction.³

Material and Methods

A hospital based cross sectional study was conducted for a period of 2 years from December 2017 to January 2019. 100 Acute myocardial infarction patients admitted to ICCU during this period were included in the study. Patients aged >18 years admitted in the ICCU with acute myocardial infarction were included in the study. Patients with preexisting Cardiac abnormalities such as pervious MI, arrhythmias, cardiomyopathy were excluded from the study.

The diagnosis of acute myocardial infarction was based on the Revised Definition of Myocardial Infarction.⁴ Typical rise and gradual fall (troponin) or more rapid rise and fall (CK-MB) of biochemical markers of myocardial necrosis with at least one of the following:

1. Ischaemic symptoms.
2. Development of pathologic Q waves on the ECG reading.
3. ECG changes indicative of ischemia (ST-segment elevation or depression).
4. Coronary artery intervention (eg: coronary angioplasty).

Methods

A detailed history was collected using structured questionnaire and special reference to the cardiovascular system was taken. A thorough physical examination was done with emphasis on the cardiovascular system. 12-lead ECG was taken at admission, at 24 hours, 48 hours and at the time of arrhythmia. EAGLE 1000 multi parameter monitors (AGE Medical Systems Company) was used to monitor the patients for 48 hours and the pattern of arrhythmias, if any, was noted. All the patients are subjected to blood CK-MB estimations and blood sugar evaluation. 2-D echocardiographic analysis and coronary angiogram was done wherever possible, during the first 48 hours of hospitalization.

Statistical analysis:^{5,6}

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 (IBM SPSS Statistics, Somers NY, USA) version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation. p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Results

Table 1: General profile of subjects in the study

Subjects	Count	%	
Age	20 to 29 years	4	4%
	30 to 39 years	6	6%
	40 to 49 years	12	12%
	50 to 59 years	48	48%
	60 to 69 years	20	20%
	70 to 79 years	10	10%
Sex	Males	76	76%
	Females	24	24%
Diabetes	Present	42	42%
HTN	Present	36	36%
Tobacco and Smoking	Present	74	74%
Alcohol	Yes	32	32%
	No		
Site of Infarction	Anterior wall	48	48%
	Inferior wall	26	26%
	Inferolateral	10	10%
	Inferior wall + RV	6	6%
	Lateral wall	10	10%
Thrombolysis	Done	70	70%
	Not done	30	30%

Table 2: Arrhythmia profile of subjects in the study

	Count	%	
Arrhythmia	Present	72	72%
	Absent	28	28%
Time of Arrhythmia (n = 72)	1 st hour	52	72.2%
	1 to 12 hours	13	18.1%
	12 to 24 hours	4	5.6%
	>24 hours	3	4.2%
Termination of Arrhythmia (n = 72)	Spontaneous	38	52.8%
	Persisted for 48 hrs	8	11.1%
	Pharmacological intervention	14	19.4%
	Electrical intervention	12	16.7%

In the study majority of subjects were in the age group 50 to 59 years (48%), 76% were males and

24% were females, 42% had diabetes, 36% had HTN, 74% were smokers, 48% had anterior wall MI, 26% had inferior wall MI, 10% had Inferolateral MI, 6% had Inferior wall + RV and 10% had Lateral wall and thrombolysis was done in 70% of subjects. (Table 1).

In the study 72% had Arrhythmia, majority had arrhythmia at 1st hour (72.2%), majority had spontaneous termination of Arrhythmia (52.8%) (Table 2).

Table 3: Type of Arrhythmia distribution among study subjects

Type of arrhythmia	Frequency (n =72)	Percent
Sinus Bradycardia	18	25.0%
VPC	12	16.7%
2 nd degree heart block	6	8.3%
AF	4	5.6%
VPC + Sinus tachycardia	4	5.6%
VT	4	5.6%
VPC + First Degree Heart Block + CHB	4	5.6%
First degree heart block + CHB	4	5.6%
VPC + Sinus bradycardia	2	2.8%
VT + Sinus tachycardia	2	2.8%
Sinus tachycardia	2	2.8%
Atrial tachycardia	2	2.8%
LAHB	2	2.8%
Sinus bradycardia + first degree heart block	2	2.8%
VPC + VT + VF + CHB	1	1.4%
VPC+RBBB	1	1.4%
VF	1	1.4%
CHB	1	1.4%

Most common Arrhythmia among MI subjects was Sinus bradycardia (25%), followed by VPC (16.7%), 8.3% had 2nd degree heart block and others as shown in above table 3.

Discussion

In the study 100 subjects with Acute Myocardial Infarction were evaluated for cardiac arrhythmias during the first week of hospitalization. Arrhythmias in hospitalized cases of acute myocardial infarction is an indirect estimate of mortality.¹

Risk factors namely age, sex, hypertension, diabetes mellitus, smoking and alcohol were also evaluated in these patients. This study showed myocardial infarction was more common among elderly, in accordance to the American Heart Association observation.⁷ In the study by SZ

Abildstrom et al.⁸ as compared to non- sudden cardiac death, the risk of sudden cardiac death, is relatively highest in the younger age groups, but the absolute risk of sudden cardiac death, is much higher among the upper age groups than the younger.

This study showed a male preponderance as was observed in the Framingham Heart study.⁹ In a prospective community based study by Shmuel Gottlieb et al.¹⁰ of consecutive AMI patients hospitalised in CCUs in the mid 1990s indicate that women fare significantly worse than do men at 30 days.

In the present study arrhythmia was detected in 72% of the patients. In a study by Aufderheide TP², 90% of patients with acute myocardial infarction have some cardiac rhythm abnormality during the first 24 hours following infarct onset.

The present study majority of arrhythmias occurred during the first hour of hospitalization. In the study by Aufderheide TP², approximately 25% have cardiac conduction disturbance within 24 hours following infarct onset.

In the present study VPCs were observed in 15.4% of the patients when they occurred alone. However they also occurred in the same patient along with other arrhythmias like heart blocks and tachyarrhythmias. In a study by Campbell RW et al¹¹ and Bigger JT et al.¹², VPCs of various frequencies were observed in upto 90% of patients with MI. In a study by Volpi A. et al¹³, approximately 36% of patients with acute myocardial infarct ion presented with less than one premature ventricular beat per hour in Holter, whereas almost 20% of patients showed frequent (more than 10 premature ventricular beats per hour). In the present study, sinus tachycardia occurred in 2.8% of the patients however it was also associated with other arrhythmias like VPC, VT and RBBB. In a study by Irwin JM¹⁴, sinus tachycardia was observed in upto 30% of the patients. In the present study, VT occurred alone in 5.6% of the patients. In a study by Echt DS et al.¹⁵ and the CAST investigators, 20% of patients had nonsustained VT and only 10% had more than one run of VT in 24 hours. In a study by Tofler GH et al.¹⁶, sustained VT occurring within 48 hours of MI seen in 2% of patients is often transient and is not associated with long-term risk of sudden cardiac death. In a study by Wolfe CL et al.¹⁷, polymorphic VT seen in 2% of patients with MI is often rapid, symptomatic and hemodynamically and electrically unstable. In our study, all the patients with VT had LV dysfunction. In a study by Bigger JT et al.¹⁸, nonsustained VT is linked to an increased risk of sudden death during the first 6 to

12 months after MI especially when associated with reduced LVEF (<40%). In our study VT was present along with VF in 1.4% of the patients. In a study by Newby KH et al.¹⁹, sustained VT and VF occur in upto 20% of patients with AMI and have been associated with poor prognosis.

Conclusion

In this study 72% of the patients had arrhythmia. Sinus bradycardia was the commonest arrhythmia. Ventricular premature contraction was a second most common arrhythmia. However ventricular premature contractions also occurred along with other arrhythmias like first degree heart block, sinus bradycardia, sinus tachycardia, right bundle branch block and ventricular tachycardia. Arrhythmias are common during first 48 hours and plays an significant role in outcome of acute of myocardial infarction.

Recommendation

Study recommends for careful monitoring of Acute myocardial infarction subjects for arrhythmias especially during first 48 hours after MI to limit mortality and morbidity by recognizing and prompt treatment.

Limitations

Study was not without limitations. Study was based on patients admitted to ICCU, hence generalization of results may vary with hospital setup. Universal sampling was used to select the subjects during the study period.

Prior publication: Nil

Conflicts of interest: Nil

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