

Original Research Article

Study of cardiac arrhythmias in acute myocardial infarction within 48 hours

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ABSTRACT

Background: The profile of coronary artery disease is different in India in terms of incidence and risk factors. Indians show higher incidence of hospitalization, morbidity and mortality than other ethnic groups. Majority of deaths in acute myocardial infarction are due to arrhythmias. These would suggest that more aggressive identification and modulation of cardiac arrhythmias in acute myocardial infarction is necessary among Asian Indian. This study is undertaken to study the profile of arrhythmias in acute myocardial infarction within 48 hours of hospitalization in our hospital.

Methods: This study was conducted in KMCH, Katihar, Bihar, India. A total of 50 (38 males, 12 females) patients admitted to the coronary care unit with diagnosis of acute myocardial infarction were included to the study. Patients were monitored for 48 hours and pattern of arrhythmias were noted.

Results: 38 males and 12 females were studied. 65% of the patients were thrombolysed. Arrhythmia was seen in 78% of the patients. 70% of the arrhythmias occurred during the first hour. 58% of the arrhythmias underwent spontaneous resolution. 23% of the patients had sinus bradycardia.

Conclusions: The present study suggests that majority of the patients with acute myocardial infarction had arrhythmias. Sinus bradycardia was the commonest arrhythmia, followed by ventricular premature contractions. However ventricular premature contractions also occurred along with other arrhythmias.

Keywords: Arrhythmia, Myocardial infarction

INTRODUCTION

Despite considerable progress in management over the recent years, 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 substantial number of patients with acute myocardial infarction have some cardiac rhythm abnormality, and approximately twenty-five percent have cardiac conduction disturbance within 24

hours following infarct onset. Almost any rhythm disturbance can be associated with acute myocardial infarction, including bradyarrhythmias, supraventricular tachyarrhythmias, ventricular arrhythmias, and atrioventricular block. With the advent of thrombolytic therapy, it was found that some rhythm disturbances in patients with acute myocardial infarction may be related to coronary artery reperfusion.²

The purpose of this study is to evaluate the incidence and profile of cardiac arrhythmias in acute myocardial infarction in the first 48 hours of hospitalization.

Attention is given to the periinfarction period (arbitrarily accepted as within 48 hours of myocardial infarction) as arrhythmias are most likely to be seen around this time.

It is known that myocardial infarction leads to severe metabolic and electrophysiological changes that induce silent or symptomatic life threatening arrhythmias. Sudden cardiac death is most often attributed to this pathophysiology, but many patients survive the early stage of a myocardial infarction reaching a medical facility where the management of infarction must include continuous electrocardiographic (ECG) and hemodynamic monitoring, and a prompt therapeutic response to incident sustained arrhythmias. During the last decade, the hospital location in which arrhythmias are most relevant have changed to include the cardiac catheterization laboratory, since the preferred management of early acute myocardial infarction is generally interventional in nature.

However, a large proportion of patients are still managed medically. Both atrial and ventricular arrhythmias may occur in the setting of acute myocardial infarction and sustained ventricular tachyarrhythmias may be associated with circulatory collapse and require immediate treatment. Atrial fibrillation may also warrant urgent treatment when a vast ventricular rate is associated with hemodynamic deterioration. The management of other arrhythmias is also based largely on symptoms rather than to avert progression to more serious arrhythmias. Prophylactic antiarrhythmic management strategies have largely been discouraged.

Although the mainstay of anti-arrhythmic therapy used to rely on antiarrhythmic drugs, particularly sodium channel blockers and amiodarone their use has now declined since clinical evidence to support such treatment has never been convincing.

Therapy for acute myocardial infarction and arrhythmia management are now based increasingly on invasive approaches.

METHODS

The study was conducted in KMCH, Katihar, Bihar, India over a period of one and a half years from January 2015 to June 2016. A total of 50 patients admitted to the ICCU were selected to enter the study. This was a descriptive study.

Inclusion criteria

Patients 18 years of age or above admitted in the ICCU with acute myocardial infarction. Myocardial infarctions in less than 48 years old were included in the study. Patients less than 18 years of age, myocardial infarction 48 hours old or more were excluded from the study.

A total of 50 patients were recruited on admission to the intensive coronary care unit at KMCH. They included 38 males and 12 females. Patients with confirmed diagnosis of acute myocardial infarction and satisfying the inclusion and exclusion criteria were included in the study group. The diagnosis of acute myocardial infarction was based on the revised definition of myocardial infarction. 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:

- Ischemic symptoms
- Development of pathologic Q waves on the ECG reading
- ECG changes indicative of ischemia (ST - segment elevation or depression).

A detailed history with 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 were 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.

The current study is hospital - based descriptive study. The test of significance used between the associations of different characteristics was the Chi square test. For statistical significance, the p value was calculated and a value less than 0.05 was considered significant. SPSS11.5 was used to analyse the data.

- + Suggestive significance (P value: $0.05 < P < 0.10$)
- Moderately significant (P value: $0.01 < P \leq 0.05$)
- ** Strongly significant (P value: $P \leq 0.01$).

RESULTS

A total number of 50 patients were studied.

Table 1: Age versus gender.

Age group	Gender		Total %
	Male %	Female %	
20-29	5.2	-	4
30-39	5.2	-	4
40-49	15.7	8.3	14
50-59	36.8	66.7	44
60-69	26.6	16.6	24
70-79	10.5	8.4	10
Total	100	100	100

Majority of males and females were in the 50-59 age groups.

Table 2: Time of arrhythmia versus gender.

		Gender	
		Male %	Female %
No	28.9	-	22
Within 1 hour	47.3	58.3	50
1-12:00 hour	21	16.6	20
12-2400 hour	2.6	16.6	6
>24hours	-	8.3	2
Total	100.0	100.0	100.0

Majority of arrhythmias in both males and females occurred during the first hour of hospitalization and was statistically significant. $P = 0.093^+$

Table 3: Termination of arrhythmia versus gender.

		Gender	
		Male %	Female %
Electrical intervention	13.1		10
Spontaneous	34.2	75	44
Persisted for 48 hours	10.5	8.3	10
Pharmacological intervention	13.1	16.6	14
No arrhythmia	28.9		22
Total	100.0	100.0	100.0

$P=0.055+$

Spontaneous resolution was noted more in females. Arrhythmia persistence for 48 hours was more in males and pharmacological intervention was more in females and was statistically significant.

Table 4: Site of infarction versus L.V. dysfunction.

	LVEF level		Total
	<40%	>40%	
Awmi	70.5	29.5	100
Iwmi	22.2	77.7	100
Ilmi	33.3	66.7	100
Iwmi+rv	100	-	100
Lwmi	60	40	100
Total	54.2	45.7	100

In AAMI majority of patients in whom 2-D echo was done, had L.V. dysfunction. In IWMI, majority did not have L.V. dysfunction.

L.V. dysfunction was found in majority of patients who had VPC, VT, sinus tachycardia. 54.2% of those with arrhythmia had L.V. dysfunction.

Table 5: Type of arrhythmia versus L.V. dysfunction.

	LVEF Level		Total
	<40%	>40%	
VPC	66.7	33.3	100
VT	100		100
Sinus bradycardia		100	100
Sinus tachycardia	100		100
Atrial tachycardia		100	100
2nd degree heart block	33.3	66.7	100
1st Vpc+1 degree heart block+chb		100	100
1st degree heart block+chb	100		100
VPC+RBBB	100		100
Vpc+sinus bradycardia	50	50	100
Vpc+sinus tachycardia	66.7	33.3	100
Vt+sinus tachycardia	100		100
Sinus bradycardia+1 degree heart block		100	100
Total	54.2	45.7	100

DISCUSSION

The current study is a descriptive study and included 50 patients. Patients were evaluated with special reference to the pattern of cardiac arrhythmias in acute myocardial infarction within 48 hours of hospitalization. Studying arrhythmias in hospitalized cases of acute myocardial infarction is an indirect estimate of mortality and assumes significance because true mortality due to acute myocardial infarction is difficult to ascertain in the community due to inadequate reporting and low autopsy rates. Indian show higher incidence of mortality than other ethnic groups.¹

The conventional 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.³ In the study by SZ Abildstrom et al 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.⁴ This study showed a male preponderance as was observed in the Framingham Heart study.⁵

In a prospective community based study by Shmuel Gottlieb et al of consecutive AMI patients hospitalised in CCUs in the mid-1990s indicate that women fare significantly worse than do men at 30 days.⁶

In a prospective community based study by Gottlieb S et al of consecutive AMI patients hospitalized in CCUs in the mid-1990s indicate that women fare significantly worse than do men at 30 day in high - risk post - MI patients with LVEF<40% or frequent VPCs the risk of

arrhythmia deaths was higher than that of non arrhythmia deaths for up to 2 years although in female patients, they became increasingly more likely to die from non arrhythmic deaths after 6 months.⁶ The risk of sudden cardiac death, myocardial infarction was slightly lower in woman. The Framingham study⁵ demonstrated that smokers have 2-3 fold increase in sudden cardiac death in each decade of life at entry between 30-50 years and this is one of the few risk factors in which the proportions of CAD deaths with sudden increase in association with risk factors. In the present study arrhythmia was detected in 78% of the patients. In a study by Aufderheide TP et al, 90% of patients with acute myocardial infarction have some cardiac rhythm abnormality during the first 24 hours following infarct onset.¹

The present study majority of arrhythmias occurred during the first hour of hospitalization. In the study by Aufderheide TP et al, approximately 25% have cardiac conduction disturbance within 24 hours following infarct onset.¹

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 al and Bigger JT et al, VPCs of various frequencies were observed in upto 90% of patients with MI. In a study by Volpi A et al, approximately 36% of patients with acute myocardial infarction 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).^{12,13} In the present study, sinus tachycardia occurred in 2.5% of the patients however it was also associated with other arrhythmias like VPC, VT and RBBB. In a study by Irwin JM et al., sinus tachycardia was observed in upto 30% of the patients. In the present study, VT occurred alone in 5.1% of the patients.¹⁰ It also occurred along with sinus tachycardia in 2.5% of patients and along with other ventricular arrhythmias in 2.5% of the patients. In a study by Echt DS et al and the CAST investigators, 20% of patients had nonsustained VT and only 10% had more than one run of VT in 24 hours.¹¹

In the present study, ventricular fibrillation occurred in 2.5% of the patients. In a study by Tofler GH et al, the incidence of ventricular fibrillation is highest during first 24 to 48 hours, particularly within the first 4 hours after the acute event, and may occur in up to 5% of patients. Ventricular fibrillation occurring within 48 hours of myocardial infarction is not predictive of higher mortality during the first year after infarction Volpi A et al concluded that primary VF, irrespective of timing, was an independent predictor of in-hospital mortality.¹²⁻¹⁴

In the present study, sinus bradycardia was observed in 23% of the patients. In a study by Pantridge JF et al, sinus bradycardia was observed in 25 to 40 percent of the patients.¹⁵ In the present study, LAHB was seen in 2.5%

of the patients, first degree heart block along with sinus bradycardia in 2.5%, second degree heart block in 8.3% of the patients, complete heart block presenting alone in 2.5% of the patients. CHB along with first degree heart block was seen in 2.5% of the patients and associated with first degree heart block and VPC in 2.5%. CHB presented along with VF, VT and VPC in 2.5%. RBBB was present along with VPC in 2.5% of the patients.

CONCLUSION

In this study 78% 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.

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Ethical approval: The study was approved by the institutional ethics committee

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