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Original Research Article

"A CLINICAL STUDY OF ARRHYTHMIAS DURING THE FIRST WEEK OF ACUTE MYOCARDIAL INFARCTION"

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ABSTRACT:

Background: 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]

OBJECTIVES: To evaluate the incidence and profile of cardiac arrhythmias during the firstone week of acute myocardial infarction and to study the outcome of arrhythmias.

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Material & Methods: Study Design: Hospital based descriptive study. **Study area:** The study was done at Department of General Medicine, Subbaiah Institute Of Medical Sciences, Shimoga, Karnataka.**Study Period:**1 year. **Study population:** Patients with confirmed diagnosis of acute myocardial infarction and satisfying the inclusion and exclusion criteria were included in the study group.**Sample size:** 50 cases were included in our study.**Sampling method:** Simple randomsampling method.**Study tools and Data collection procedure:**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[5].

Results: Majority of arrhythmias underwent spontaneous resolution. It persisted in 10% of patients for 48 hours, 14% required pharmacological intervention, 12.8% required electrical intervention.VPCs occurred in isolation in 15.4% of patients but it also occurred along with other arrhythmias Sinus bradycardia was the most common arrhythmia.

CONCLUSION: Sinus bradycardia is the commonest arrhythmia. Ventricular premature contraction is the 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.

Key words: arrhythmias, acute myocardial infarction**,**ventricular tachycardia.

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[1,4].

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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 atrio ventricular 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 1 week of hospitalization. Attention is given to the peri infarction period (arbitrarily accepted as within 48 hours of myocardial infarction) as arrhythmias are most likely to be seen around this time[3].

OBJECTIVES: To evaluate the incidence and profile of cardiac arrhythmias during the firstone week of acute myocardial infarction and to study the outcome of arrhythmias.

Material & Methods:

Study Design: Hospital based descriptive study.

Study area: The study was done at Department of General Medicine, Subbaiah Institute Of Medical Sciences, Shimoga, Karnataka.

Study Period:1 year.

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Study population: Patients with confirmed diagnosis of acute myocardial infarction and satisfying the inclusion and exclusion criteria were included in the study group.

Sample size: 50 cases were included in our study.

Sampling method: Simple randomsampling method.

Inclusion Criteria: Patients 18 years of age or above admitted in the ICCU with acute myocardial infarction.

Myocardial infarction less than 48 hours old.

Exclusion Criteria:

Patients less than 18 years of age.

Myocardial infarction 48 hours old or more.

Ethical consideration: Institutional Ethical committee permission was taken prior to the commencement of the study.

Study tools and Data collection procedure:

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[5]. 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:

a) Ischaemic symptoms.

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b) Development of pathologic Q waves on the ECG reading.

c) ECG changes indicative of ischaemia (ST – segment elevation or depression).

d) Coronary artery intervention (eg: coronary angioplasty)

Clinical Data

A detailed history with special reference to the cardiovascular system was taken. A thorough physical examination was done with emphasis on the cardiovascular system.

Investigations

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

The current study is hospital – based descriptive study. The test of significance used between the associations of different characteristics wasthe Chi square test. For statistical significance, the p value was calculated and a value less than 0.05 was considered significant. SPSS 20 was used. Significant (P value:<0.05), Not significant (P value : >0.05).

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OBSERVATIONS & RESULTS:

Table 1: Age wise distribution of the study population

	No.of Patients	Percent
20-29	2	4.0
30-39	2	4.0
40-49	7	14.0
50-59	22	44.0
60-69	12	24.0
70-79	5	10.0
Total	50	100.0

The study group with 50 patients had ages ranging from 22 to 78 years. Majority were above the age of 50 years.

	No.of Patients	Percent
Arrhythmia	39	78.0
No arrhythmia	11	22.0
Total	50	100.0

Table 2: Gender Distribution of Cases

Gender	No.of Patients	Percent
Male	38	76.0
Female	12	24.0
Total	50	100.0

Table 3: ArrhythmiaOccurrence

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76% of the cases were constituted by males and 24% by females.

78% of the patients were detected to have arrhythmia.

Table 4:Site of infarctions

	No.of Patients	Percent
Anterior wall	22	44.0
Inferior wall	16	32.0
Inferolateral	3	6.0
Inferior wall +rv	3	6.0
Lateral wall	6	12.0
Total	50	100.0

Majority of patients had anterior wall myocardial infarction, followed by inferior wall myocardial infarction.

Table 5: Time of Arrhythmia Detection

Time of Arrhythmia Detection		
	No.of Patients	**Percent**
with in 1st hr	24	48.0
1-12hrs	10	20.0
12-24hrs	3	6.0
>24hrs	1	2.0
no arrhythmia	12	24.0
Total	50	100.0

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Majority of arrhythmias occurred during the first hour of hospitalization.

Table 6: Arrhythmia Termination

	No.of Patients	Percent
Spontaneous	22	44.0
Persisted for 48hrs	5	10.0
Pharmacological intervention	7	14.0
Electrical intervention	5	10.0
No arrhythmia	11	22.0
Total	50	100.0

Majority of arrhythmias underwent spontaneous resolution. It persisted in 10% of patients for 48 hours, 14% required pharmacological intervention, 12.8% required electrical intervention.

VPCs occurred in isolation in 15.4% of patients but it also occurred along with other arrhythmias Sinus bradycardia was the most common arrhythmia.

Table 7:Termination of Arrhythmia Vs Gender

Termination	Gender		Total
	Male	Female	
No arrhythmia	11 (28.9%)	_	11 (22%)
Spontaneous	13 (34.2%)	9 (75%)	22 (44%)
Persisted for 48 hours	4 (10.5%)	1 (8.3%)	5 (10%)
Pharmacological intervention	5(13.1%)	2 (16.6%)	7 (14%)
Electrical intervention	5 (13.1%)	_	5 (10%)
Total	38 (100%)	12 (100%)	50 (100%)

(P< 0.05)

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 (P< 0.05).

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Table 8: Age Distribution Vs Arrhythmia

Age	arrhythmia		Total
	arrhythmia	no arrthyhmia	
20-29	1	1	2
30-39	1	1	2
40-49	6	1	7
50-59	18	4	22
60-69	10	2	12
70-79	3	2	5
Total	39	11	50

Among those who had arrhythmias, majority were in the 50-59 year group followed by 60-69 year group. Statistically significant ($P< 0.05$).

The commonest arrhythmia in the 40-49 year group was sinus bradycardia.

Commonest in 50-59 year group was VPC.

Commonest in 60-69 year group was sinus bradycardia.

Commonest in 70-79 year group was second degree heart block.

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 during the first week of hospitalization. It appears that there exists a combination of biochemical, electrophysiological, autonomic and yet unknown genetic factors culminating in so called perfect storm resulting in arrhythmias in post-MI period.

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There is a temporal distribution to the occurrence and postulated mechanisms of ventricular arrhythmia in the post-MI period. In animal studies, an early, potentially reversible, phase within the first 30 minutes following epicardial coronary artery occlusion was identified. This is followed by an irreversible phase from 90 minutes to 72 hours, during which there is rapid evolution of the characteristics of the infarcted tissue. Reperfusion contributes to the profound electrophysiological changes.

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. Indians show higher incidence of mortality than other ethnic groups[1].

Also, South Indians have higher prevalence[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[6]. In the study by SZ Abildstrom et al[7] 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[8]. In a prospective community based study by Shmuel Gottlieb et al[9] of consecutive AMI patients hospitalised in CCUs in the mid 1990s indicate that women fare significantly worse than do men at 30 days. In a study by Yee Guan Yap et al[10] in high – risk post – MI patients with LVEF <40% or frequent VPCs, the risk ofarrhythmia deaths was higher than that of non arrhythmia deaths for up to two years although in female patients, they became increasingly

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more likely to die from non arrhythmic deaths after 6 months. The risk of sudden cardiac death, following myocardial infarction was slightly lower in women[7].

In a study by Hallstrong AP et al[11], out of 310 survivors of out of the hospital cardiac arrest, the recurrent cardiac arrest rate was 27% at 3 year follow-up among those continued to smoke after the index event compared with 19% in those who stopped smoking.

In the present study arrhythmia was detected in 78% 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 al[12] and Bigger JT et al[13], VPCs of various frequencies were observed in upto 90% of patients with MI. In a study by Volpi A et al[14], 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 2.5% of the patients however it was also associated with other arrhythmias like VPC, VT and RBBB. In a study by Irwin JM[15], sinus tachycardia was observed in upto 30% of the patients. In the present study, VT occurred alone in 5.1% of the patients. It also occurred along with sinus tachycardia in 2.5% of patients and along with other ventricular arrhythmias in 2.5% of the patients.

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In the present study 70% of arrhythmias occurred during the first hour of hospitalization. In the study by Aufderheide TP2, 90% of patients with acute myocardial infarction have some cardiac rhythm abnormality within 24 hours following infarct onset. In the present study 78.3% of patients with L.V. dysfunction had arrhythmias. In a study by Ale jandro Macchia et al[16], compared to patients with EF >50%, systolic dysfunction patients had higher mortality and sudden death rates. In a study by Yee Guan Yap et al[10], in high risk post.

CONCLUSION:

Sinus bradycardia is the commonest arrhythmia. Ventricular premature contraction is the 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. Majority of the arrhythmia occurred during the first hour of hospitalization. Majority of the arrhythmias underwent spontaneous resolution.

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