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Original Research Article

A Study of New Onset Arrhythmias in Acute Myocardial Infarction

P. K. Sinha[1], Dhananjay Prasad[2], Sushil Kumar[3]

[1]Associate Professor, Department of Medicine, Darbhanga, Medical College & Hospital, Laheriasarai, Bihar, India.

[2]Junior Resident, Department of Medicine, Darbhanga, Medical College & Hospital, Laheriasarai, Bihar, India.

[3]Assistant Professor, Department of Medicine, Darbhanga, Medical College & Hospital, Laheriasarai, Bihar, India.

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Corresponding author: Dr. Dhananjay Prasad
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Abstract

Aim: To study various types of arrhythmias in relation to time between the admission and the onset.

Material & Method: The present study was done a Cross-sectional prospective study conducted at the Department of Medicine, Darbhanga, Medical College & Hospital, Laheriasarai, Bihar, India. The study was conducted over a period of one year.

Results: Predominance of alcoholism and smokers were present in the study group. Time interval between presentation and onset arrhythmias was studied in the study population. It was found that majority of arrhythmias occurred in the first day post MI which was 76.7%.

Conclusion: Myocardial infarction was most common in 40 – 49 years age group. Incidence is least in below 30 years age group. Majority of deaths was seen in 50 – 59 years age group. Males were the predominant population and sex did not affect the prognosis significantly. Alcohol consumption and smokers were predominant in the study group. Alcoholism does not affect the outcome. Majority of arrhythmias occurred on day 1 post MI. the time interval between the presentation and onset of arrhythmias does not affect the prognosis significantly.

Keywords: Arrhythmias, Acute Myocardial Infarction

Introduction

Despite a decrease in overall cardiovascular mortality over the past decades, _17 million deaths a year occur worldwide as a result of cardiovascular disease (1) and _50% of these are reported to be sudden cardiac deaths (SCD) (2). In the elderly, constituting the major age group at risk, SCD is often associated with chronic degenerative diseases, such as coronary artery disease (with acute myocardial infarction (AMI) as its ultimate consequence),valvular diseases, and heart failure. [1]

Acute myocardial infarction is one of the commonest emergencies in the developed and developing countries.

Death from arrhythmias especially ventricular tachycardia has been one of the commonest causes of sudden cardiac death

following acute myocardial infarction. In the prefibrinolytic era, deaths reported after acute MI were as high as 60 percent, which is usually seen within first twenty four hours, especially in the first hour. This high death rate was attributable to usually ventricular fibrillation [2].

Data from large epidemiological studies have clearly demonstrated that AF is associated with an increase in mortality and morbidity. [3, 4]The combination of AF and congestive heart failure is particularly ominous in that it appears that the development of either condition has a marked detrimental impact upon the mortality of the other. [5-7]

Many studies have been done to evaluate the incidence of arrhythmias complicating the peri-infarct period, to study their prognostic significance and outcomes with various treatment modalities [8]. But comparison of these studies is not easy because of the different study populations, different types of infarct, and also the variations in the types of arrhythmias reported.

Hence, this study aims to study various types of arrhythmias in relation to time between the admission and the onset.

Material & Method:

The present cross-sectional prospective study was conducted at the Department of Medicine, Darbhanga, Medical College & Hospital, Laheriasarai, Bihar, India. The study was conducted over a period of one year.

Inclusion Criteria:

1. Patients with ECG changes suggestive of acute MI
2. Patients presenting within 24 hours of onset of symptoms suggestive of acute MI
3. Acute MI patients lysed or not presenting within 24 hours of onset of illness
4. Willingness of the patient

Exclusion Criteria:

1. Patients with past history of MI
2. Patients with coronary artery disease on drugs
3. Patients who are known cases of arrhythmias on treatment.
4. Patients with structural defects in the heart like Rheumatic Heart diseases and Congenital Heart diseases
5. Patients without willingness to participate

Approval was obtained from Institutional Ethics Committee. Informed consent was obtained from all the participants.

In this study, 150 cases of acute myocardial infarction presenting to the Darbhanga, Medical College & Hospital, Laheriasarai, Bihar, India, were studied for occurrence of various new onset arrhythmias in relation to type of MI, wall involved and time duration of illness.

Patients were included according to the criteria mentioned above, after getting informed consent. These patients were closely monitored with serial ECG done at 1, 3, 6, 12, 24, 48, 72 hours. Various investigations like urea, sugar, creatinine, serum cholesterol, serum electrolytes, and cardiac enzymes were done and assessed.

ECG parameters like heart rate, rhythm, p wave morphology, qrs morphology, t wave morphology, PR interval, ST segment, QT interval, p wave axis, qrs axis, chamber hypertrophy / dilatation, were assessed periodically and noted.

Statistical Analysis:

All the parameters were tabulated. Mean, Standard deviation were analyzed using SPSS 20 software. All the biochemical parameters were correlated with serum cholinesterase using intercorrelations. Chi-square test was the test of significance used for qualitative variables to find the association between them. T test was the test of significance used for comparing quantitative variables with qualitative variable. One-way Anova is used as test of

significance to assess various parameters with the compound used for poisoning.

Results:

In this study the total number of cases studied were 150. These cases were divided into five age groups. 2.67 % of cases were in below 30 yrs age group. 13.3 % were in 31 – 39 yrs age group. A majority of 39.3 % belong to 40 – 49 yrs age group. 27.3 % were in 50 – 59 yrs age group.17.3 % were in above 60 yrs age group. [Table 1]

Table1: Age Distribution

Particulars	Frequency	Percentage
Below 30yrs	4	2.67
31 to 39yrs	20	13.3
40 to 49yrs	59	39.3
50 to 59yrs	41	27.3
Above 60yrs	26	17.3
Total	150	100.0

In this study, 58.7 % of cases were male. 41.3 % cases were female. Male sex predominance was present in the study group. [Table 2]

Table 2: Sex distribution

Particulars	Frequency	Percentage
Male	88	58.7
Female	62	41.3
Total	150	100.0

Incidence of alcohol intake in this study population was 59.3 %. 40.7 % were nonalcoholic. Predominance of alcoholism was present in the study group. Smoking frequency among the study population was 68.7 %. 31.3% of cases were nonsmokers. Hence this study included predominantly smokers. [Table 3]

Table 3:Alcohol and Smoking distribution

Particulars	Frequency	Percentage
Alcohol Intake		
No	61	40.7
Yes	89	59.3
Total	100	100.0
Smoking		
No	47	31.3
Yes	103	68.7
Total	150	100

Time interval between presentation and onset arrhythmias was studied in the study population. It was found that majority of arrhythmias occurred in the first day post MI which was 76.7%. 15.3 % cases developed arrhythmia in the second day. 6 % developed in the third day. Only 2% of cases developed arrhythmia on day 4. [Table 4]

Table 4: Time duration between presentation and onset of arrhythmias in days

Particulars	Frequency	Percentage
1	115	76.7
2	23	15.3
3	9	6
4	3	2

Total	150	100.0

Out of the 150 cases of acute MI studied, 84.7 % of cases were alive, 15.3 % of cases died. [Table 5]

Table 5: Distribution of the Outcome

Particulars	Frequency	Percentage
Dead	23	15.3
Alive	127	84.7
Total	150	100.0

12 different types of arrhythmias were observed in the study population. Each occurred at a different frequency. VPC (36.7%) was clearly the most common arrhythmia observed. Followed by AIVR-12%, I degree AVB-10.7%, II degree AVB-7.33%,VT – 8%, LBBB-6.67%, CHB – 4%, RBBB, APC - 4%, AF – 4%,VF – 4%, SVT- 2% respectively.[Table 6]

Table 6: Distribution of the Type of Arrhythmias

Particulars	Frequency	Percentage
I DEGREE AVB	16	10.7
II DEGREE AVB	11	7.33
AF	4	2.67
AIVR	18	12
APC	6	4
CHB	6	4
LBBB	10	6.67
RBBB	5	3.33
SVT	2	1.33
VF	5	3.33
VPC	55	36.7
VT	12	8
Total	150	100.0

Discussion:

Complications of MI may be classified as mechanical, arrhythmic, inflammatory (early pericarditis and post-MI syndrome) sequelae, and left ventricular mural thrombus (LVMT). Other fatal complications are right ventricular (RV) infarction and cardiogenic shock [9].

Usually peri- infarct arrhythmias are benign and self-limiting. At times it can cause hypotension, increase myocardial oxygen requirements and can lead to fatal ventricular arrhythmias. These should be monitored and treated aggressively [10].

Additional data from the thrombolytic era were presented by Eldar et al. [11] who compared their data with that of a historical cohort of patients treated in the pre-thrombolytic era. In this report only patients with paroxysmal AF were included. Patients with paroxysmal AF had a higher 30 day mortality (OR 1.32, 95% CI 0.92–1.87) compared with patients without the arrhythmia. However, patients with AF had relatively lower 30 day mortality rate when they were treated in the thrombolytic era (OR 0.64, 95% CI 0.44–0.94) in comparison to historical controls.

Information on causes of death in AMI patients with and without AF is available for only one trial. The mode of death in patients who have AF in combination with an AMI was studied by Pedersen et al. [12] in the TRACE study.

Pharmacological NHE1 inhibition in AMI animal models has only assessed pre-

treatment [13]. These reports showed reduced VF incidence [14] without changes in other ventricular arrhythmias [13], and eliminated reperfusion induced AP shortening [15]. In humans, NHE1 inhibition during AMI has not been assessed.

Rubboli et al. [16] treated 104 patients with AF and AMI with a triple therapy of ASA, clopidogrel, and warfarin after reperfusion therapy with PCI and stenting. No cardiac or peripheral thrombo-embolic events were observed in 1 month follow-up but 5 (4.8%) periprocedural haemorrhages occurred, three of them needed blood transfusion or surgery. The overall bleeding rate in this small group was 20% with triple therapy (ASA and thienopyridine warfarin/heparin) compared with 4.5% with dual antiplatelet therapy (OR 5.25 95% CI 0.53–51.63, n.s.). One sub-acute stent thrombosis occurred in a patient treated with warfarin and ASA.

Ruiz-Nodar et al. [17] recently published data of a retrospective analysis on anticoagulation treatment in patients with AF after coronary artery stenting. Of 426 patients, 64%were treated for acute coronary syndromes (including 20.1% AMI). A total of 213 received triple therapy with coumadins, aspirin, and clopidogrel. Non-anticoagulation with coumadin was associated with a significant increase in major cardiovascular events (38.7 vs. 26.5% P ¼ 0.01) and all-cause mortality 27.8 vs. 17.8%, P ¼ 0.02) at a median follow-up of 594 days. [17]

In a study by Patricia Jabre et al, 3220 patients hospitalized with incident MI from 1983 to 2007 in Olmsted country were studied. Atrial fibrillation was identified in these patients by diagnostic codes and ECG. 304 patients had AF before MI. 729 patients developed AF after MI (218 within 2 days, 119 between 3 and 30 days, and 392 more than 30 days post MI). Mortality risk was increased in patients with AF irrespective of clinical characteristics and heart failure. Mortality risk varied according to the timing of AF after MI, with maximum risk for MI occurring 30 days post MI [18].

Martin St.John Sutton et al studied 263 subjects in whom Transthoracic 2D Echocardiogram and arrhythmia monitoring were performed at baseline, 1 year and 2 years after MI. ECG was assessed for the prevalence of VT and VPC. The study showed the prevalence of VT and PVC's in 20% and 29% at baseline, 22% and 35% at 1 year, 33% and 39% at 2 years respectively. This study concluded that alteration in 20

LV architecture and function by post MI remodeling makes it a substrate for ventricular arrhythmias [19].

Brenhardt G, SeipelL, Loogen Fdid a study to assess prognostic significance of arrhythmias in acute myocardial infarction. The study concluded that frequent ectopic beats, multifocal ectopic beats, ventricular bigeminy, ventricular salvoes, ventricular tachycardia and the R on T phenomenon are considered warning arrhythmias before ventricular fibrillation develops following myocardial infarction. Recent studies show that lidocaine can be used to prevent ventricular fibrillation following MI [20].

Tatli E, Alicik G, Buturak A, Yilmaztepe M, Aktoz M studied arrhythmias following revascularization procedures in the course of acute myocardial infarction to assess whether they are indicators of reperfusion or ongoing ischemia. Study suggests that ongoing vascular occlusion and ischemia may lead to arrhythmias which cannot be distinguished from reperfusion arrhythmias [21].

Piccini JP, Berger JS, Brown DL studied early sustained ventricular arrhythmias complicating acute myocardial infarction. The study concluded that sustained ventricular tachycardia /ventricular fibrillation remains a significant complication in patients undergoing percutaneous coronary intervention for

acute MI and is associated with high in-hospital mortality [22,23].

Conclusion:

Myocardial infarction was most common in 40 – 49 years age group. Incidence is least in below 30 years age group. Majority of deaths was seen in 50 – 59 years age group. Males were the predominant population and sex did not affect the prognosis significantly. Alcohol consumption and smokers were predominant in the study group. Alcoholism does not affect the outcome. Majority of arrhythmias occurred on day 1 post MI. the time interval between the presentation and onset of arrhythmias does not affect the prognosis significantly.

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