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A Study of 100 Cases of Arrhythmias in First Week of Acute Myocardial Infarction

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ABSTRACT

Aim: *To study the incidence of arrhythmias in the first week of Acute Myocardial Infarction (AMI) with respect to type of arrhythmia, age distribution, sex and location of infarction, various risk factors in a patient population from western India and to evaluate its prognostic value and relation of complications with incidence of arrhythmias.*

Study Design: *A prospective clinical study consisting of 100 patients was undertaken to investigate the relationship of arrhythmia with site of AMI, timing, complications and outcome in terms of mortality and morbidity.*

Materials and Methods: *Hundred cases of AMI with arrhythmia admitted in ICCU of Seth Vadilal Sarabhai General Hospital, Ahmedabad were taken in the study.*

Results: *Among 100 cases, maximum incidence (40%) was found in 6th decade. Incidence of arrhythmias was higher in males (81%) than females (19%). Anterior wall infarcts (61%) were more common than inferior wall (36%). Ventricular Premature Contraction (VPC) was the commonest arrhythmia is anterior wall MI (45.9%) and in inferior wall MI (19.4%).*

Conclusion: *Hence, in one of the largest study of this kind in a patient population of Western India, we established VPC's as the most common arrhythmia in AMI patients. Older patients (sixth decade) and males are affected more commonly. Ventricular tachycardia is more fatal in acute inferior wall MI.*

Keywords: *Arrhythmia, Acute myocardial infarction, Location of infarct.*

INTRODUCTION

Despite impressive strides in diagnosis and management, over last three decades Acute Myocardial Infarction continues to be a major public health problem in developing and developed countries. Coronary artery disease claims target number of lives of individuals in their most productive years. The incidence of coronary artery disease has reported to be on an increase in India and occur almost a decade earlier in life as compared to the people of western world, as it has been found the Indian in particular and South Asian in general are genetically more susceptible to Atherosclerotic coronary artery disease.

Cardiac arrhythmias directly and indirectly affect the morbidity and mortality of the patient with myocardial infarction and they are also related to in hospital and late mortality[1].

During the past few years, increasing emphasis is placed on earliest pathophysiological events that terminate in Acute Myocardial Infarction.

Thrombolytic therapy and advent of CABG and PTCA have made it possible to reperfuse the obstructed vessels within a short time and to salvage the jeopardized myocardium and has thus, revolutionized the treatment of Acute Myocardial Infarction. Significant salvage of myocardium and improved survival results only when these myocardial sparing interventions are instituted within hours of onset of symptoms.

This study includes 100 patients admitted in Intensive Coronary Care Unit having Acute Myocardial Infarction with Arrhythmias within first week of hospitalization and especially the first 24 hours was undertaken to evaluate Incidence profile of arrhythmias and ultimately mortality and morbidity of various arrhythmias in Acute Myocardial Infarction.

AIMS AND OBJECTIVES

To Study the incidence, influence of location of infarction, the prognostic value of various cardiac arrhythmias and the relation of associated complications on incidence of cardiac arrhythmias in Acute Myocardial Infarction.

MATERIAL AND METHODS

It is a prospective clinical study consisting of 100 consecutive patients admitted in ICCU of SETH VADILAL SARABHAI GENERAL HOSPITAL with following criteria.

INCLUSION CRITERIA

a) Age: 25 to 80 Years
b) Diagnosed as Acute ST elevation MI
c) Reached to ICCU within window period of 12 hrs
d) Only those who are treated with fibrinolytic agents on admission
e) Patients who developed arrhythmias within 1 week of acute MI
f) Those who admitted in the hospital for 1 week so proper follow up could be possible
g) Patients who have given Informed consent and who are willing to participate in this study

EXCLUSION CRITERIA

a) Age <25 or >80 years
b) Non ST elevation MI
c) Presented to emergency department out of window period of thrombolysis
d) Patients who didn't developed arrhythmias within 1 week or who had arrhythmias after 1 week of admission
e) Those who have contraindication of Thrombolysis (CVA-Hemorrhagic or Ischemic, Recent major surgery or facial trauma, Head injury, CNS malignancy, Bleeding disorders, INR>1.8) are excluded
f) Those patients who were not willing for thrombolysis.

Clinical history was recorded including age, sex, occupation and signs and symptoms of myocardial infarction like chest pain, palpitation, perspiration, nausea, vomiting and breathlessness along with significant past, personal and family history.

The necessary investigation carried out included blood sugar, serum creatinine, Serum cholesterol CPK-MB / Troponin-I were done.

12 lead ECG was taken immediately on admission and once daily and as when required.

Diagnosis of acute myocardial infarction was made when corresponding leads showed fresh appearance of 'Q' wave of more than 0.04 sec duration and having depth of more than 25% of R wave height with ST segment deviation and T wave changes.

- Anterior wall MI included such changes in V1 to V6
- Inferior wall MI included changes in leads II, III and aVf
- Anterior + Inferior wall MI included changes in leads II, III and aVf and V1 to V6
- Extensive anterior wall MI included changes in lead I, aVl and VI to V6
- Antero septal MI included changes in lead VI to V4
- Inferior and right ventricular infarction included changes in leads II; III, aVf and RV1 to RV6

Various types of arrhythmias were diagnosed by ECG and on cardiac monitor. Patient was examined daily and/or as frequently as needed by noting pulse, blood pressure and signs of any complication. Careful search was made daily to find out any rhythm disorder and if any irregularity was detected, it was recorded immediately on electrocardiogram.

Two-dimensional echocardiography with Doppler echocardiography was done within first five days of onset of symptoms in some patients.

RESULTS

TABLE-1: Age Distribution in Acute MI with Arrhythmia

Age in Years	No. of Cases	Percentage (%)
21 to 30	1	1
31 to 40	5	5
41 to 50	25	25
51 to 60	40	40
61 to 70	22	22
71 to 80	7	7
More than 80	--	--

Among 100 cases studied maximum incidence was more common during the sixth decade(40%). The youngest was 28 year old, while the oldest was 75 year old.(Table-1)

AMI with arrhythmia is more common in males (81%) than females (19%).

The anterior wall infarction with arrhythmia (61%) was more common than the inferior wall infarction (36%) and combined anterior and inferior wall infarction was observed in only 3 % of cases.(Table-2)

TABLE-2: Incidence of Anatomical Sites of Myocardial Infarction with Arrhythmia

Anatomical Sites of Myocardial Infarction	Number of Cases	Total Percentage
Anterior Wall	61	61
Inferior Wall	36	36
Ant + Inferior Wall	03	03

Complications like Left ventricular dysfunction and cardiogenic shock are more common with anterior wall infarction combined with inferior wall infarction (100%).(Table-3).

TABLE-3: Incidence of Various Complications in Relation to Anatomical Site

COMPLICATION	ANTERIOR WALL	INFERIOR WALL	ANTERIOR+ INFERIOR WALL	TOTAL
LEFT VENTRICULAR DYSFUNCTION	19 (31.14%)	05 (13.88%)	03 (100%)	27 (27%)
CARDIOGENIC SHOCK	08 (13.11%)	03 (8.33%)	03 (100%)	14 (14%)
TOTAL	27 (44.25%)	08 (22.22%)	06 (100%)	41 (41%)

In Acute MI most common arrhythmia are VPC's (33%), followed by Atrial fibrillation (13%), Complete heart block (11%) and Ventricular tachycardia (11%) (Table-4)

TABLE- 4: Incidence of Various Arrhythmias in Acute MI

S. NO.	Arrhythmia	No. of Cases	%	No. of Death	%
1.	Ventricular premature beat	33	33	-	-
2.	Atrial premature beat	07	07	-	-
3.	Atrial fibrillation	13	13	02	15.31%
4.	Ventricular tachycardia	11	11	07	63.63%
5.	Second degree A-V block type 1	03	03	-	-
6.	Second degree A-V block type 2	05	05	02	40%
7.	First degree A-V block	04	04	-	-
8.	Bifasicular block	03	03	-	-
9.	RBBB	03	03	03	100%
10.	LBBB	04	04	02	50%:
11.	Complete heart block	11	11	05	45.45%
12.	Ventricular fibrillation	02	02	02	100%
13.	Ventricular standstill	01	01	01	100%

Among the arrhythmias in Anterior wall infarction VPC's are the most common (45.90%).(Table-5)

TABLE-5: Incidence of Arrhythmia in Anterior Wall Infarction

Sr. No.	Type of Arrhythmia	No. of Cases	%	No. of Deaths	%
1.	Ventricular premature beats	28	45.90%	-	-
2.	Atrial premature beats	05	8.20%	-	-
3.	Atrial fibrillation	08	13.11%	02	25%
4.	Ventricular tachycardia	09	14.75%	07	77.78%
5.	Bifasicular block	02	3.28%	01	50%
6.	RBBB	03	4.92%	03	100%
7.	LBBB	01	1.64%	01	100%
8.	Complete heart block	05	8.20%	03	60%

Most common arrhythmia in Inferior wall is Ventricular premature beats (19.44%) followed by Second degree A-V block type 2 (16.66%) (Table-6)

ABLE-6: Incidence of Arrhythmia in Inferior Wall Infarction

Sr. No.	Type of Arrhythmia	No. of Cases	%	No. of Deaths	%
1.	Ventricular premature beats	07	19.44	-	-
2.	Atrial premature beats	02	5.56	-	-
3	Atrial fibrillation	05	13.89	-	-
4.	Ventricular tachycardia	02	5.56	-	-
5.	Second degree A-V block type 1	02	5.56	-	-
6.	Second degree A-V block type 2	06	16.66	02	33.33
7.	First degree A-V block	03	8.33	-	-
8.	LBBB	03	8.33	01	33.33
9.	Complete heart block	06	16.66	02	33.33

Higher mortality was in anterior wall (27.8%) than inferior wall (13.9%), while highest in combined anterior and inferior wall infarction (100%).

Only three cases of Ventricular fibrillation and Ventricular standstill were reported and mortality was 100%.[5]

DISCUSSION

Maximum incidence was found in sixth decade in present study consistent with Prabhu et al, Rajgopalan studies. The increased incidence of myocardial infarction seen in fifth and sixth decade was probably due to increased prevalence of atherosclerosis and CAD in this decade. As the age increases, the vessels become stiffer, causing rise in systolic blood pressure and left ventricular hypertrophy which is an independent risk factor for IHD. It was found that excess CAD mortality attributable to hypercholesterolemia increased more than five times with age in a study done in elderly between 60 to 79 years of age in Observational Kaiser Permanente coronary heart disease in elderly[8]

In present study the incidence in Male and Female ratio is 4.26:1 consistent with Fluck and Roy's findings. The onset of symptomatic Coronary artery disease is typically a decade earlier in men than in women. The premenopausal women are protected from coronary artery disease because of the high level of HDL. After menopause the risk of coronary artery disease increases in women to reach equal to that of men in 7th or 8th decade[8].

In our study anterior wall infarction was observed in 61%, Inferior wall infarction in 36% and combined in 3% of cases that is consistent with result of Imperial.

Chest pain is the most common presenting symptom (95%) with dyspnoea (49%) and nausea and vomiting (35%) and is consistent with Yater and Wright. It was believed that accumulation of lactic acid and substance P due to anaerobic glycolysis in the ischemic tissue stimulated the afferent nerves and caused pain. Although chest pain was the most common presenting symptom,

the type did vary from person to person. Most commonly it was retrosternal heaviness with radiating to the left arm but some patients also had burning pain or epigastric pain[8].

Hypertension and Diabetes mellitus promote LVH and atherosclerosis and they are accompaniments of Coronary artery disease. It was found that life style (sedentary), smoking and obesity are modifiable risk factors along with Hypertension, diabetes and dyslipidemia which can be modifiable by pharmacological therapy. Whereas age, male gender and genetics are non-modifiable risk factors[8].

VPC's in our study (33%) is comparable with Annamalai and Kasirajan (28.5%) and Hurcaitz (30%).While APC's in our study (7%) is comparable with Pick (7.25%), Master (5%) and Hurcaitz (6%). Due to imbalance in autonomic nervous system and electrolytes arising because of myocardial infarction, the commonest abnormality seen is abnormal and enhanced automaticity leading to premature contraction and thus, they are found to be the most common arrhythmia. It is possible that partial depolarization and failure to reach the maximal diastolic potential can induce automatic discharge in most of the cardiac fibres.[8]

In our study incidence of Atrial fibrillation is 13%, which is consistent with Julian (16%), Broan (10%) and Annalmalai and Kasirajan (14%). Out of the supraventricular arrhythmia, atrial fibrillation in relation to myocardial infarction was found to be the most common arrhythmia with no specific predilection for any wall of infarction. Atrial fibrillation was associated with high ventricular rate and left ventricular failure.[10]

Incidence of Ventricular tachycardia (11%) in present study is well comparable with Desanctis et al (10%), Broan (11.1%) and Annamalai and Kasirajan (9.5%), The incidence of ventricular tachycardia was more common in anterior wall infarction (9 cases) than in inferior wall infarction (2 cases) as it might be related also to amount of myocardium damaged. The urgent need of revascularization in form of Primary Angioplasty and CABG for treating ventricular tachycardia is not available in our set up which might have caused higher mortality in patients with ventricular tachycardia[8].

In the present study incidence of Ventricular fibrillation (2%) is comparable with Lawrence and Annamalai. The occurrence of ventricular fibrillation supports the Moe's multiple wavelet hypothesis theory, according to which when there is a non-uniformity of recovery of ventricles, fibrillation can occur primarily by re-entry extension of circulating wave fronts. In present study there was no primary ventricular fibrillation. All the ventricular fibrillations that occurred were secondary ventricular fibrillation i.e. the patients had both anterior and inferior wall infarction and large mass of infarcted myocardium and left ventricular failure and cardiogenic shock leading to ventricular fibrillation.[5,12]

Incidence of A-V block is more frequent in patient with Inferior wall infarction (47.21%) than with Anterior wall infarction (8.20%) and is comparable with finding of Sulton et al.[3]

Incidence of Bundle branch block in present study is (7%) is comparable with Hunt et al, Bauer et al and Julian et al.[4,9]

The association between Posterior wall infarction and A-V block is easier to express since in 83% of cases the A-V node is supplied from Right coronary artery and posterior wall infarction is usually due to occlusion of right coronary artery. The incidence of various types of A-V block is more common with inferior wall infarction as it is due to transient increase in vagal tone or to the release of Adrenaline. Hence, these blocks are transient and may respond to Atropine if they are associated with inferior wall MI. However, the blocks associated with anterior wall MI are more likely to have higher mortality as in anterior wall MI the heart block is usually related to ischemic malfunction of the conductive system which is commonly associated with extensive myocardial necrosis [2,8,].

Incidence of Complete heart block in Acute Myocardial Infarction in our study (11%) is consistent with Annamalai (9.5%) and

Clemmnson (13%) Mortality in Complete heart block complicating Acute MI in present study 45.45% is well consistent with Bichard et al (37-48%).Gupta, Lichstan and Chaddha have found that patients with complete heart block have higher incidence of congestive heart failure and ventricular asystole and greater amount of myocardial necrosis and a large incidence of complication.

CONCLUSION

We can conclude that Acute MI with arrhythmia was most common in Sixth decade (40%) and male to female ratio is 4.26:1. Incidence of arrhythmia with anterior wall infarction was more common (61%) than with Inferior wall infarction (36%). Most common arrhythmia observed was premature beats and VPC's were more common (33%). Conduction disturbances were common in Inferior wall infarction (55.54%). Atrial fibrillation (13%), Ventricular tachycardia (10%) are more common with anterior wall infarction. Complete heart block (11%) are more common with Inferior wall infarction. Arrhythmia carrying very high mortality includes Ventricular standstill (100%), Ventricular fibrillation (100%), Ventricular tachycardia (63%) and Bundle branch block (71.11 %).

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