Research Article

Arrhythmias in Myocardial Infarction- A Hospital based study

Dr Basavaraj M Patil

Associate Professor, Department of General Medicine, Raichur Institute of Medical Sciences, Raichur.

*Corresponding author: *drbasavarajmpatil@gmail.com*

Abstract

Acute myocardial infarction remains a major health problem. The deaths with acute myocardial infarction is said to occur within first 24 hours after myocardial infarction and is attributed to arrhythmias. The objective of this study is to assess incidence of arrhythmias in myocardial infarction **METHODS:** 100 patients with acute myocardial infarction admitted to the ICC unit of Govt. General Hospital, Gulburga & Basaveshwar Teaching & General Hospital Gulburga were taken for present study. A detailed case history was taken and a meticulous physical examination was done for each patients. This was recorded in a proforma at the time of admission, detailed history, physical examination, time of onset and type of arrhythmias was noted. **RESULTS:** Male to female ratio with 4:1, mortality was more in the group with risk factors of smoking, Hypercholesterolemia, hypertension and diabetes. Commonest arrhythmias noticed in this study were ST-40%, VPBs – 35%, AVB-22%, BBB -20%, SB-15%, and VT -10%. **CONCLUSION:** The commonest arrhythmias encountered were sinus tachycardia followed by ventricular premature beats, AV blocks, bundle branch block, sinus bradycardia and ventricular tachycardia. SB & Complete heart block were more common in IWMI whereas ST, VPC, and UB f were more common with AWMI.

Keywords: Myocardial infarction, Arrhythmias, Risk factors.

Introduction

There has been a substantial decline in deaths from the past 50 years, but cardiovascular disease leftovers the single most important cause of natural deaths in all developed countries of the world.

Deaths from arrhythmias in the situation of myocardial infarction (MI) have been one of the most widespread causes of unexpected cardiac death. 60% of all deaths related with acute myocardial infarction (AMI) occur within 1st hour and are attributable to ventricular arrhythmias, in particular ventricular fibrillation[1].

There is good relationship between the site and type of arrhythmias. Sinus bradycardia, sinoatrial, escape rhythms, complete heart block and Wenchebach type are typically associated with inferior wall myocardial infarction. Ventricular and Atrial premature beats are more often seen in anterior wall myocardial infarction.[2]

There is a view that the cascade leading to sudden death from arrhythmias can be predicted by certain connections among structural and functional abnormalities. For new tools of prediction, the modification of the existing tools, and the commencement of well designed intervention trials are the steps that must be taken towards the more well-organized prevention of early deaths from arrhythmias.[3,4] Hence this study is undertaken to assess the commonest types of arrhythmias in myocardial infarction and relation of these arrhythmias with site of infarction.

Methods

100 patients with acute myocardial infarction admitted to the ICC unit of Govt. General Hospital, Gulburga & Basaveshwar Teaching & General Hospital Gulburga from January to December 1998 were taken for present study. Written and informed consent to participate in the study from each patient and the study protocol was approved by the institutional review board including ethical issues.

Sample size

100 cases diagnosed as acute myocardial infarction with arrhythmias was taken for the study.

Inclusion and exclusion scriteria

Patients admitted to the ICCU with history of chest pain within 48 hours, electrocardiogram taken and those patients with acute changes of MI in ECG were included in the study. Those patients with angina pectoris and unstable angina or chest pain due to any other cause excluded from the study. Subendocardial infarction is excluded from the study.

Criteria for established MI

The diagnosis of acute myocardial infarction was based on the following criteria:

1. Typical chest pain lasting for more than 30 minutes

2. ST segment elevation >= 1 mm in two or more of limb leads as measured 0.08 second after J point / serial ST segment and T wave changes and /or development of pathological Q-waves in the same leads

3. Increase in serum CPK-MB enzyme level more than normal.

Data was collected in a pre-tested proforma by full filling objectives of the study, detailed history, physical examination, thorough cardiovascular and other systemic examination and necessary investigations. A twelve lead conventional electrocardiogram was recorded at the earliest after admission to the unit and electrocardiogram was repeated on three consecutive days after admission. All the patients were monitored for 48-72 hours for arrhythmias, acute left ventricular failure, cardiogentic shock and were treated with appropriate measure. Their stay in the ICCU was prolonged, if any complication developed or demanded further close observations.

At the time of admission to the ICCU , blood samples were drawn for routine investigations like Hb%, TC, DC, ESR, blood sugar, serum creatinine lipid profile and serum CPK-MB and SGOT, chest x-ray and echocardiography was done subsequently.

All patients were evaluated for risk factors like diabetes mellitus, hypercholestrolemia, hypertension and smoking. Routine investigations were restricted to the patients who really needed them. Enzyme studies were done in most of the cases.

Statistical methods

Descriptive statistics such as mean, SD and percentage was used to present the data.

Results

A total of 100 patients with male and female ratio of 4:1, with MI were included in the study. The maximum number of patients were found in the age group of 51-60 years (36%), followed by 41-50 years (24%), 61-70 years (20%), 31-40 years (14%), < 30 years (4%), and 71-80 years (2%). Mean age of patients was 53.61 ± 12.43 years.

In the present study, 70% of patients had smoking, 36% of patients had hypercholesterolemia, 36% of patients had hypertension, and 20% of patients had diabetes mellitus as a risk factor.

The majority of patients (76%) had ST segment elevation MI, of which 19.7% had extensive anterior wall MI, 11.8% had inferior wall MI, 31.57% had anteroseptal wall MI, 23.7% had inferior wall with RV extension, 3.9% had anterolateral wall MI, 5.26% had inferior lateral wall MI, and non-ST elevation MI patients were 24%.

Table 1 : Incidence of various types of arrhythmias in relation to site of infarction

Arrhythmia	Total	Anterior Wall MI	Inferior Wall MI	Combined MI
Sinus tachycardia	40	30	10	-
Sinus bradycardia	15	02	13	-
VPB	35	24	11	-
Ventricular tachycardia	10	8	2	-
First degree AV block	7	1	6	-
Second degree AV block	2	-	2	-
Complete heart block	15	1	12	2
Unifascicular block	18	13	4	1
Bifascicular block	2	2	-	-
Trifascicular block	-	-	-	-

The incidence of various types of arrhythmias in myocardial infarction in relation to site of infarction is shown in table 1. In arrhythmias of which Sinus tachycardia and ventricular arrhythmias are more common, 40% of cases had Sinus tachycardia followed by 35% of cases had ventricular premature beats (VPBs), 22% of patients had AV blocks, 20% of cases had Bundle branch blocks (BBB), 15% of patients had Sinus bradycardia (SB), 4% of patients had Junctional rhythm, 3% had Junctional ectopics , 2% had atrial fibrillation (AF) and Atrial tachycardia (AT) each.

In total of 40 cases, 30 cases of sinus tachycardia were seen in extensive anterior wall. In total of 15 cases, 13 cases of sinus bradycardia were seen in inferior wall MI. Total out of 10 cases, 8 cases of ventricular premature beats were seen in extensive anterior wall MI. Out of 100 cases, 15 cases of arrhythmias were seen in extensive anterior wall MI.

Table 2: Showing time of appearance of Arrhythmias

Arrhythmia	No. of cases							
	1	2	3	4	5	6	7	8
Sinus tachycardia	34	4	2	-	-	-	-	-
Sinus bradycardia	13	2	-	-	-	-	-	-
Ventricular premature beats	28	3	2	-	1	-	1	-
Ventricular tachycardia & VF	7	3	-	-	-	-	-	-
AV blocks	14	2	1	1	-	-	-	-
Bundle branch blocks	17	2	1	-	-	-	-	-

Incidence of arrhythmias from day 1 to day 8 was studied and presented in table-2. According to this most of the patients presented with symptoms after 1 day or 3 days. The presence of arrhythmia was taken as on day 1 or day 3, etc. According to the result, Sinus tachycardia, Sinus bradycardia, Ventricular tachycardia & VF, AV blocks, Bundle branch blocks occurred within 24 hours. VPBs occurred after 24 hours.

Sinus tachycardia and sinus bradycardia present on the first day at presentation of patient symptoms had reverted back to normal sinus rhythm. Bundle branch block occurred from day 1 to day 3 it was usually left

bundle branch block (LBBB) or right bundle branch   block (RBBB).

Table 3: Showing incidence of various AV blocks

Type of AV blocks	No. of patients	Percentage
First degree AV block	05	05
Second degree AV block	02	02
Mobitz Type I	2	2
Mobitz Type II	-	-
Complete heart block	15	15

Table 3 shows incidence of various AV blocks. 15% of myocardial infarction patients had complete heart block, followed by 5% had first degree blocks and 2% had second degree blocks and mobitz type-I each.

Table 4-: Showing incidence of complication other than Arrhythmia

Complications	No. of patients	Percentage
Left ventricular failure	26	26
Cardiogenic shock	10	10
Cerebrovascular accident	02	02
Congestive cardiac failure	06	06
Pericarditis	02	02

Incidence of complication other than Arrhythmia was shown in Table 4. 26% of myocardial infarction patients had Left ventricular failure, followed by 10% had Cardiogenic shock, 6% had Congestive cardiac failure, 2% had Cerebrovascular accident and Pericarditis each.

Table 5: Showing time of appearance of arrhythmia after admission

Time of appearance (hours)	No. of patients	Percentage
< 12	30	30
12 – 24	21	21
24 – 48	15	15
48 – 72	10	10

30% patients had shown appearance of arrhythmia after admission in less than 12 hours followed by 21% patients had shown between 12 to 24 hrs, 15% had shown between 24-48 hrs and 10% had shown between 48-72 hrs presented in Table 5.

Discussion

The maximum incidence of acute myocardial infarction observed in the present study was in the age group of 31 – 70 years (94%), of this 36% patients belong to 51 – 60 years group. Only 4% of cases were below the age of 30 years. Age incidence in this study is almost similar to the studies done by Marthin TC et al.[5] and Mohit Shah et al.[6] where 85% patients were between 35 and 75 years old. Age incidence is most likely more common because of life style, economic status and multiple risk factors.

Incidence of myocardial infarction in present study was more in males (80%) as compared to females (20%). The study done by Kock HL et al.[7] showed 72% male and 24% females. It is more common because of life style and more risk factors like Hypercholesterolemia , hypertension, smoking, and diabetes mellitus.

In the present study, incidence of smoking was 70%, incidence of Hypercholesterolemia was 36% and incidence of hypertension was 25%, 20% had diabetes mellitus and 18% family history of IHD, almost similar findings were observed in the study done by Sushma Pandey et.al.[8] Mortality was more in the group with risk factors of hypertension, smoking and diabetes.

Sinus bradycardia was commonly associated with inferior wall myocardial infarction. In the present study, 15 patients had sinus bradycardia, out of which 13 were of inferior wall MI. Similar observations were made by Michel Rotman et al.[9] (10 – 30%), Philip J Podrid[10].

In the present study, sinus tachycardia was present in 40% patients and commonly associated with anterior wall MI (30% cases) compared to inferior wall MI (10% cases). It represents an appropriate physiological response to left ventricular failure, congestive heart failure (CHF) or stimulation and over activity of the sympathetic nervous system. The findings are similar to the study done by Philip J Podrid.[10]

Atrial fibrillation (2% cases) and atrial tachycardia (2% cases) were seen in extensive anterior wall MI as most commonly in those who had significantly left ventricular failure and CHF, and had increased mortality not because of arrhythmia itself, but to factors associated with it, particularly LV failure and cardiogenic shock. Study done by Philip J Podrid [10] ,Galcera Thomas J et al[11] and Pizzetti F[12] et al explained the AF and tachycardia was related with increased mortality in patients with LV failure.

Ventricular arrhythmias were seen in 45 cases of which VPBs in 35 cases, VT & VF in 10 cases. Study conducted by Julain Villacastin [13] showed total incidence of VPB 12% and VT 18% and Mossimo Zoni Berisso et al[14] showed 19.7% VPBs and VT 6.8%. In the present study, incidence of VPBs cases seen more as compared to Julain Villacastin [13] and Mossimo Zoni Berisso et al[14].

In the present study, the patients presented with symptoms after 1 day or 3 days. The presence of arrhythmia was taken as on day 1 or day 3. According to the result, Sinus tachycardia, Sinus bradycardia, Ventricular tachycardia & VF, AV blocks, Bundle

branch blocks occurred within 24 hours. VPBs occurred after 24 hours.

Conclusion

The commonest arrhythmias observed were sinus tachycardia followed by ventricular premature beats, AV blocks, bundle branch block, sinus bradycardia and ventricular tachycardia & VF. Most of the arrhythmias were seen in the first 48 hours. SB & BBB were most commonly seen in IWMI where as ST, VPBs, AF and flutter were commonly seen in AWMI. ST, AF, flutter, VT and BBB were more commonly associated with LV failure. Further studies with larger sample size are needed to confirm the possible mechanisms between association of arrhythmias.

References

1. Podrid PJ. Ventricular arrhythmias after acute myocardial infarction, incidence and clinical features. BJMU; 2006 Apr 26.pp.1-8.
2. John KA. A history of cardiac arrhythmias. 2nd ed. Chapter I. In: arrhythmias. WB Saunders Company;2000.
3. Hurikuri H., Castellanson A, Myerburg R,. Sudden detah due to cardiac arrhythmias. NEJM; 1990.
4. John MM, Zipes PD. Therapy for cardiac arrhythmias. 7th ed. Chapter 30 In:Heart disease –A textbook of cardiovascular medicine, Braunwald's. Pennsylvania:WB Saunders Company; 2001. P.713.
5. Martin TC, Longhuyzen HV. The age specific incidence of admission to te intensive care unit for acute myocardial infarction in Antigua and Barbuda. West Indian Med J 2007; 56(4):326-9.
6. Mohit Shah, Nikita Bhatt et al. A study of 100 cases of arrhythmias in the first week of acute MI in Gujarat. J of Clinical and Diagnostic Research 2014; 8(1):58-61.
7. Kock HL, debruin A. Incidence of first acute myocardial infarction in the Netherlands. The Netherlands J Med 2007; 65(11):434-41.
8. Sushma Pandey, Suresh Pandey et al. A prospective study of MI patients admitted in a tertiary care hospital of south-eastern Rajasthan. Int J Biol Med Res. 2012; 3(2):1694-1696.

9. Rotman M, Wanger G, Wallace A Brady arrhythmias in acute myocardial infarction. Circulation 1972; 45:703-22.

10. Podrid PJ. 0Arrthymias after acute myocardial infarction. Postgraduate Medicine 1997; 102(5):679-88.

11. Galecera TJ, Moreno M, Alberola G, Polo B, Aranaga M, Fernandez R, Incidence clinical characteristics and prognostic significance of supraventricular tacharrythmias in acute myocardial infarction.PMID;2007.

12. Pizzetti F, Turazza FM, Franzosi MG, Barlera S, Ledd A, Maggioni AP, et al. Incidence and prognostic significance of atrial fibrillation in acute myocardial i: the GISSI-3 data. Heart 2001; 86:527-32.

13. Villacastin J, Almendral J, Arenal A, Albertos J, Ormactxe J, Peinado R, et al. Incidence and clinical significance of multiple consecutive, appropriate, high energy discharges in patients with implanted cardiovester- Defibrillator. Circulation 1996; 93:753-62.

14. Berisso MZ, Daniele M. Value of programmed ventricular stimulation in predicting sudden death and sustained ventricular tachycardia in survivors of acute myocardial infarction. Am J Cardiol 1996; 77:673-80.