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PATTERN OF ARRHYTHMIAS IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

Cardiology

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ABSTRACT

Background- Acute myocardial infarction is characterized by generalized autonomic dysfunction that results in enhanced automaticity of the myocardium and conduction system. **Objectives-** To assess the incidence of tachy- and bradyarrhythmic episodes in patients with acute myocardial infarction. To find out whether incidence of arrhythmias is higher in STEMI compared to NSTEMI. **Methods-** Hundred patients admitted consecutively into PIMS CCU with the diagnosis of MI are studied. All of them have electrocardiographic evidence of infarction in case of STEMI. They also have electrocardiographic evidence of infarction and positive cardiac troponin I in case of NSTEMI. **Results-** 30% of study population had valvular heart diseases whereas 70% were free of any valvular disease. 92% of study population were TROP I positive and 8% were TROP I negative. 11% of study population underwent thrombolysis and 6% underwent angioplasty. 83% of study population had NSTEMI and 17% had STEMI. **Conclusion-** 58% of study population had arrhythmias. 75.9% of arrhythmias were single and 24.1% were multiple 69% of arrhythmias were major and 31% were minor. There was no significant association between incidence of arrhythmias/ multiple arrythmias / major arrhythmias with valvular heart disease/ heart failure/ TROP I/ procedure/ Killips groups.

KEYWORDS

Acute Myocardial Infarction, Cardiac Markers, Arrhythmia, tachycardia, heart failure.

Introduction-

AMI is characterized by generalized autonomic dysfunction that results in enhanced automaticity of the myocardium and conduction system. Electrolyte imbalances (eg, hypokalemia and hypomagnesemia) and hypoxia further contribute to the development of cardiac arrhythmia. The damaged myocardium acts as substrate for re-entrant circuits, due to changes in tissue refractoriness.[1] Enhanced efferent sympathetic activity, increased concentrations of circulating catecholamines, and local release of catecholamines from nerve endings in the heart muscle itself have been proposed to play roles in the development of peri-infarction arrhythmias. Furthermore, transmural infarction can interrupt afferent and efferent limbs of the sympathetic nervous system that innervates myocardium distal to the area of infarction. The net result of this autonomic imbalance is the promotion of arrhythmias[2,3]. Cardiac arrhythmias and conduction abnormalities complicating acute myocardial infarction (AMI) have been associated with adverse prognosis in numerous reports[5,6]. The rationale behind this study was to assess the incidence of tachy- and bradyarrhythmic episodes in patients with acute myocardial infarction. To find out whether incidence of arrhythmias is higher in STEMI compared to NSTEMI. Are there any specific arrhythmias responsible for the increased mortality in acute MI.The mortality rates of arrhythmias above and below the atrioventricular node are to be compared.

Materials and Methods-

Study design- Prospective study/ cross sectional analytic study
Study population-100 Patients admitted with acute MI within 14 days of the index event in PIMS CCU
Study Duration- from Jan 2014 to Nov 2015.

Exclusion criteria-Severe valvular heart disease, Pregnancy, previous ICD implantation.
Sampling Technique- Consecutive sampling technique.
Sample Size- 100 patients with acute MI.
Study tool- Pre- structured, pilot tested questionnaire was used for data collection containing demographic details and markers.

Methodology- After ethical approval and informed consent was taken, hundred patients admitted consecutively into PIMS CCU with the diagnosis of MI were studied. All of them had electrocardiographic evidence of infarction in case of STEMI. Clinical features with electrocardiographic evidence of infarction and positive cardiac troponin I at any time during the index admission in case of NSTEMI.

All patients undergone continuous ECG monitoring throughout their stay in the CCU. The arrhythmias were classified to major/minor, brady/tachy, supraventricular/ventricular. The cases also be classified to lone / multiple arrhythmias. Cases are classified according to 'Killip' classification into four groups:

Class I: No signs of pulmonary or venous congestion;
Class II: Moderate heart failure as evidenced by rales at the lung bases, S_3 gallop, tachypnea, or signs of failure of the right side of the heart, including venous and hepatic congestion;
Class III: Severe heart failure, pulmonary edema;
Class IV: Cardiogenic shock

Statistical Analysis- Data will be consolidated and entered a Microsoft Excel spreadsheet and then transferred to Epi info version (7.1.3.0. centre for disease control and prevention, Atlanta, Georgia, USA, 2013) software for analysis. Frequency tables and chi-square test was used as test of significance to determine association.

Results-

Table 1- Distribution of participants according to Age and Sex

Age	Count	Percent
< 40	2	2.0
40 – 49	4	4.0
50 – 59	23	23.0
60 – 69	41	41.0
70 – 79	19	19.0
80 – 89	10	10.0
90 – 99	1	1.0
Male	71	71.0
Female	29	29.0

In the present study 71% of the study population was males and 29% were females. The most common age group in the present study to get the attacks of MI was 60-69 years in 41% of participants were seen followed by 50-59 years comprising 23%.

Table 2- Distribution according to Valvular Heart Disease, Diagnosis, Trop -I, & Procedure

VHD	Count	Percent
Yes	30	30.0
No	70	70.0
Trop I		
Positive	92	92.0
Negative	8	8.0
Procedure		

No procedure	83	83.0
Thrombolysis	11	11.0
Angioplasty	6	6.0
Diagnosis		
STEMI	17	17.0
NSTEMI	83	83.0

As per table 3, 30% of study population had valvular heart diseases whereas 70% were free of any valvular disease. 92% of study population were TROP I positive. 11% patients underwent thrombolysis and 6 % patients underwent angioplasty. 83% of study population had NSTEMI and 17% had STEMI.

Table3- Distribution according to KILLIPS

KILLIPS	Count	Percent
KILLIPS 1	84	84.0
KILLIPS 2	12	12.0
KILLIPS 3	2	2.0
KILLIPS 4	2	2.0

84% of study population belonged to Killips 1, 12% in Killips 2, 2% in Killips 3 and 2% in Killips 4.

Table 4- Association of arrhythmias and KILLIPS class

KILLIPS	Yes		No		X^2	p
	Count	Percent	Count	Percent		
KILLIPS 1	47	56.0	37	44.0	2.02	0.569
KILLIPS 2	8	66.7	4	33.3		
KILLIPS 3	2	100.0	0	0.0		
KILLIPS 4	1	50.0	1	50.0		

84 patients were in Killips class 1 followed by 12 patients in Killips 2, 2 patients in Kiliip 3 and 2 patients in Killips 4. 56% of Kiilips 1 had arrhythmias whereas 66.7% of Killips 2 had arrhythmias. Subjects belonging in Killips 3 and Killips 4 were only 4% put together. But the association was not significant.

Table 5- Association arrhythmias and Heart failure

HF	Yes		No		X^2	p
	Count	Percent	Count	Percent		
Yes	7	77.8	2	22.2	1.59	0.208
No	51	56.0	40	44.0		

Of the 9 patients with heart failure 77.8% had arrhythmias, whereas of the 91 patients with no evidence of heart failure 56% had arrhythmias. There was no significant association between arrhythmias and heart failure.

Discussion-

100 Patients admitted with acute MI within 14 days of the index event in PIMS CCU who satisfied the inclusion criteria were analysed for occurrence of arrhythmias. The arrhythmias were classified in to major/minor, brady/tachy arrhythmia, supraventricular/ventricular arrhythmia. The cases were classified into single / multiple arrhythmias. Cases were classified according to 'Killips' classification into one of the four Killips groups. Major proportion of the study population was between 50- 79 years of age (83%). 71% of the study population were males and 29% were females. 67% of study population were diabetics, 55% were hypertensives, 35% were dyslipidemics and 36% had a previous history of myocardial infarction. 23% of study population were having both diabetes and hypertension. 11% of study population underwent thrombolysis and 6% underwent angioplasty. 83% of study population had NSTEMI and 17% had STEMI. 9% Of study population had heart failure and 91% were devoid of heart failure.[7] 84% of study population belonged to Killips 1, 12% in Killips 2, 2% in Killips 3 and 2% in Killips 4. 58% of study population had arrhythmias. 75.9% of arrhythmias were single and 24.1% were multiple. 69% of arrhythmias were major and 31% were minor. 43.1% of arrhythmias were tachy-arrhythmias and 36.2% were brady-arrhythmias. There was no significant correlation between arrhythmias and valvular heart disease/ heart failure/ TROP I/ procedure/ Killips groups. The results of the present study were like the study conducted by Alpman, Hindman and Lie KI.[8,9,10] 68% of patients who underwent no procedure had major arrhythmias. 66.7% of thrombolysed patients had major arrhythmias whereas all patients who underwent angioplasty had major arrhythmias. Among patients with heart failure 57.1% had major arrhythmias whereas 70.6% of patients without heart failure had major arrhythmias.[11,12]There was no correlation between major arrhythmias and valvular heart disease/ heart failure/ TROP I/ procedure/ Killips groups which is like the present study.[13,14]

Conclusion-

58% of study population had arrhythmias. 75.9% of arrhythmias were single and 24.1% were multiple. 69% of arrhythmias were major and 31% were minor. 43.1% of arrhythmias were tachy-arrhythmias and 36.2% were brady-arrhythmias. There was no significant association between incidence of arrhythmias/ multiple arrythmias / major arrhythmias with valvular heart disease/ heart failure/ TROP I/ procedure/ Killips groups.

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