Original Article

Frequency of Sustained Ventricular Arrhythmias in Non-ST Segment Elevation Myocardial Infarction (STEMI) Patients

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ABSTRACT

Objective: To determine the frequency of sustained ventricular arrhythmias in Non-ST segment elevation myocardial infarction (NSTEMI) patients.

Study Design: Descriptive case series study.

Place and Duration of Study: This study was conducted at the Department of Cardiology, Chaudhry Pervaiz Ellahi Institute of Cardiology, Multan from 10-Aug-2018 to 9-Feb-2019.

Materials and Methods: A total of 170 patients who presented in department of cardiac emergency with Non ST segment myocardial infarction were enrolled in the study. Each Patient with NSTEMI was monitored centrally on cardiac monitor for 3 days and documented sustained ventricular arrhythmias on ECG were further interpreted by senior consultant cardiologist. SPSS version 23 was used for data analysis.

Results: Mean age of patients was 50.66±6.95 years. There were more male patients as compared to female patients i.e. n=140 (82.4%) male patients and n=30 (17.6%) female. There were n=59 (34.7%) patients who were having diabetes mellitus. Similarly n=75 (44.1%) patients who were having hypertension. n=58 (34.1%) patients who were having history of smoking and n=15 (8.8%) patients were having hypercholesterolemia. There were n=16 (9.4%) patients who were having positive family history of coronary artery disease (CAD). Cardio-version was done in n=11 (6.5%) patients of non-STE myocardial infarction. Sustained ventricular arrhythmias (VA) occurred in n=12 (7.1%) patients of non-STEMI.

Conclusion: The incidence of Sustained ventricular arrhythmias in patients of non-ST elevation myocardial infarction (NSTEMI) is 7.1%. The occurrence of such events remains difficult to predict. Cardiac monitoring should be done in all patients to monitor occurrence of such Sustained ventricular arrhythmias in these patients.

Key Words: Non-ST elevation myocardial infarction, ventricular arrhythmia, Cardiac monitoring.

INTRODUCTION

Ischemic heart disease (IHD) also known as coronary heart disease is a term to define heart problems. It is the leading cause of morbidity and mortality in the world[1]. IHD usually caused by atherosclerosis of coronary arteries. Middle income community is more prevalent o ischemic heart disease and furthermore male gender commonly affected[2].

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About 50% of mortality due to cardiovascular diseases occurs in developing countries. South Asian population contributes $1/4^{th}$ of developing world and strongly suffered from increase in CVD[3].

Myocardial ischemia caused by atherosclerosis may manifest itself as effort angina, unstable angina and myocardial infarction. Acute myocardial infarction (AMI) is the most life threatening condition and is a serious emergency in hospitals[4]. After admission in hospital mortality rate decreased about 30% in within two decades but is still high. Among cardiac problems non ST segment elevation myocardial infarction (NSTEMI) holds a big role in acute coronary syndrome[5].

Management of these patients is heterogeneous and delayed as compared to approach to STEMI patients[6,7]. But NSTEMI patients should be treated aggressively because of their increased risk of ventricular arrhythmias and other heart rhythm disorders[8]. If ventricular arrhythmia documented admission of patients in cardiac care unit and aggressive treatment strategy with complete cardiac mentoring is necessary[9]. Although incidence and severity of ventricular

arrhythmias is well documented in STEMI patients but they cannot be considered and compared under similar detail of NSTEMI patients because of their increasing incidence rate[10].

As Upon extensive literature surveying it was evident that no such study has been done in Pakistan and very little literature is available from international researchers with different clinical results. So there is a dire need to see current magnitude of the problem in our local population of Southern Punjab in 2018. So we have planned to conduct this study to provide correct baseline database of our local population. This study will be ultimately very rewarding in overall improvement of treatment and management protocols of myocardial infarction in local population of Southern Punjab. So it will help to decrease morbidity and mortality.

MATERIALS AND METHODS

This cross sectional descriptive study was started after ethical approval from hospital ethical committee and study was proceeded at department of Cardiology, Chaudhry Pervaiz Ellahi Institute of Cardiology, Multan from 10-Aug-2018 to 9-Feb-2019. Written informed consent was taken from patients after detailed information of study purpose and confidentiality policy. Patients of both genders, age groups (30 – 65 years) presented with diagnosis of NSTEMI within 24 hours of onset of symptoms were included in study. Patients of STEMI & previous history of infarction, chronic kidney disease (already diagnosed & patients with kidney damage lasting for more than 3 months with glomerular filtration rate (GFR) <60 ml/min/1.73 m^2), liver cirrhosis (already diagnosed & on ultrasound shrunken irregular nodular liver with splenomegaly & Ascites Pregnant ladies, previous history of arterial or venous thrombosis, history of coronary artery bypass surgery and don't give consent of participation were excluded from the study.

Non-ST elevation myocardial infarction defined by ECG ST-segment depression or prominent T wave inversion and/or positive biomarkers of necrosis (Troponin I > 0.03ng/ml, troponin T >0.02ng/ml, CK-MB > 25U/L) in the absence of ST-segment elevation. Sustained Ventricular arrhythmias (VA) also included sustained ventricular tachycardia and fibrillation. Rhythm disturbance shown showing wide QRS complexes at more than 120/m observed on electrocardiography either on monitor or ECG machine, lasting more than 30 seconds or accompanied by hemodynamic instability requiring cardioversion and originating from the ventricle labeled as ventricular tachycardia. Similarly ventricular Fibrillation (VF) was defined as undulations at irregular intervals with varying amplitude and shape on electrocardiography monitoring without discrete p or QRS complexes that resulted in prompt hemodynamic compromise requiring direct-current (DC) cardioversion. Diabetes: known cases of diabetes which are on either oral hypoglycemic drugs or on insulin for more than 1 year including both controlled (HbA1c ≤6.5%) and uncontrolled diabetes (HbA1c >6.5). Hypertension is known hypertensive patients who are taking any hypertensive treatment for more than 1 year including both controlled (BP<140/90) and uncontrolled (BP>140/90). Smoking: It was deemed as positive if patient has positive history of smoking at least 10 cigarettes per day for the duration of more than 2 years. Hypercholesterolemia: patient with total blood cholesterol level >200mg/dl or >5.2 mmol/L. Family History: It was deemed as positive if any first degree blood relative has ischemic heart disease. Cardioversion: pharmacological (IV Amiodarone 150-300mg) or electrical (DC cardioversione 150-360-J).

After registration of patient all baseline investigations were done including cardiac enzyme. Electro cardiography and echocardiography was done. Each Patient with NSTEMI enrolled in this study is monitored centrally on cardiac monitor for 3 days and documented sustained ventricular arrhythmias (as defined in operational definitions) on ECG was further interpreted by senior consultant cardiologist having more than five years-experience after fellowship to overcome inter-observer bias.

Data analysis was done by using Statistical Package for the Social Sciences (SPSS) version 23.Categorical variables like gender, diabetes, smoking, hypertension, cardioversion and sustained ventricular arrhythmias were calculated and presented in form of frequencies and percentage. Mean and SD was calculated and presented for numerical variables like age. Chi-square test was applied to see association among variables. P value equal or less than 0.05 was considered as significant.

RESULTS

One hundred and seventy patients of non-STEMI were included in this study. Mean age of patients was 50.66±6.95 years. There were more male patients as compared to female patients i.e. n=140 (82.4%) male patients and n=30 (17.6%) female. There were n=59 (34.7%) patients who were having diabetes mellitus and remaining n=111 (65.3%) patients were not having diabetes mellitus. Similarly n=75 (44.1%) patients who were having hypertension while n=95 (55.9%) patients were not having hypertension and n=58 (34.1%) patients who were having history of smoking and n=15 (8.8%) patients were having hypercholesterolemia.

There were n=16 (9.4%) patients who were having positive family history of coronary artery disease (CAD). Cardio-version was done in n=11 (6.5%) patients of non-STE myocardial infarction. While in remaining n=159 (93.5%) no such event occurred that require electrical or pharmacological cardio-version.

Sustained ventricular arrhythmias (VA) occurred in n=12 (7.1%) patients of non-STEMI, while no Sustained ventricular arrhythmia occurred in remaining n=158 (92.9%) patients.

Chi-square was applied to check the association of sustained ventricular arrhythmias with effect modifiers. It was seen that diabetes mellitus (p=0.000), hypertension(p=0.029), smoking(p=0.000), hypercholesterolemia(p=0.000), family history of coronary artery disease (p=0.000)and cardio-version(p=0.000)were the risk factors for sustained ventricular arrhythmias. (Table. I).

Table No. I: Association of Sustained Ventricular Arrhythmias with effect modifiers

Variable	Sustained Ventricular Arrhythmias		P-value
	Yes n=12 (7.1%)	No n=158 (92.9%)	
Age	49.91±6.78	50.72±6.98	0.700
Gender			
Male	n=8 (66.7%)	n=132 (83.5%)	0.139
Female	n=4 (33.3%)	n=26 (16.5%)	
Diabetes mellitus	n=10 (83.3%)	n=56 (35.4%)	0.000
Hypertension	n=7 (58.3%)	n=70 (44.3%)	0.029
Smoking	n=5 (41.7%)	n=41 (25.9%)	0.000
Hyper-cholesterolemia	n=11 (91.7%)	n=15 (9.5%)	0.000
Family History of Coronary Artery Disease	n=8 (66.7%)	n=23 (16.5%)	0.000
Cardioversion	n=9 (75.0%)	n=35 (22.2%)	0.000

DISCUSSION

This study was designed to investigate the frequency of sustained ventricular arrhythmias in consecutive NSTEMI patients and study will be a new gate towards modern health initiative for research on cardiac patients. This study will also fulfill the reference gap of regional reports on this topic. Sustained Ventricular arrhythmias (VA) comprehend ventricular fibrillation (VA) or ventricular tachycardia (VT), its incidence is associated with magnitude of autonomic imbalance, ischemia area size reduced left ventricular function, extend of acute strains and myocardial infarction[11]. Patients of non-ST elevation myocardial infarction have 4 folds lower risk of ventricular arrhythmias as compare to ST elevation myocardial infarction. Approximately in 60% of non ST elevation myocardial infarction cases ventricular arrhythmias occurred after 48 hours[12].

Inherited cardiomyopathies like short QT syndrome, long QT syndrome, brugada syndrome, hypertrophic cardiomyopathy, genetic variants and catecholaminergic polymorphic VT increased the incidence of VA[13]. In this study frequency of VA was found 5.29% in non STEMI patients. Numerous studies available on VA in STEMI patients but controversially VA incidence in NSTEMI patients was reported in very few studies. Number of reports suggested early invasive planning on these patients[14].

Main outcomes variable of our study was in hospital VA in NSTEMI patients. Drew et al[15] conducted a sub analysis after collecting data from four clinical trials and reported that incidence of in hospital VA is 2.1% in NSTEMI patients and mean time of 1st arrhythmic event was 78 hours from randomization. History of COPD, presence of ST segment changes at the time of admission were predictors of VA and VA is the strong predictor of in hospital mortality. Another recent analysis was done by McDaniel et al[16] on this topic and reported in hospital incidence of VA in 1.5% of NSTEMI patients and in 50% of them arrhythmias occurred after 48 hours of patients' enrolment. This study concluded that VA associated with number of risk factors like increased platelet count, body weight, heart rate elevated troponin, Kellip class above 1 and angina. In hospital mortality is associated with VA occurred in NSTEMI patients during hospital admission.

A single centered study was conducted by Rahimiet al[17] in 2006 on NSTEMI patients and reported incidence of VA 2.6% and it was not associated with increased death incidence. Early invasive coronary intervention was done in these patients. Similarly Gupta et al[18] reported 4.3% VA cases, 40% of events occurred after 48 hours. Time above 48 hours is the strongest predictor of in hospital mortality within 30 days.

During decision making about treatment plan risk of VA and sudden death because of cardiac events is the main concern. Recent guidelines suggested that aggressive and continuous monitoring of ECG should be done in NSTEMI patients till 48 hours after admission. It was also mentioned in literature that VA may occur at any time during hospitalization. Furthermore, VA consistently associated with in hospital mortality[19].

In this usual practice, admissions of NSTEMI patients in CCU and ICU are showingan increasing clinical challenge. In this emerging conditionlimited availability of invasive therapy and hospital beds is main challenge. So, evaluation of risk at the time of admission of NSTEMI patients problematic for developing triage algorithmic rule to recommend most easy care level[20].**.**

CONCLUSION

The incidence ofSustained ventricular arrhythmias in patients of non-ST elevation myocardial infarction (NSTEMI) is 5.29%. The occurrence of such events remains difficult to predict. Cardiac monitoring should be done in all patients to monitor occurrence of such Sustained ventricular arrhythmias in these patients.

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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