

Reperfusion Arrhythmias in Patients Presenting with Acute Myocardial Infarction

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Abstract

Introduction: Reperfusion arrhythmias in patients presenting with acute myocardial infarction factors are common and cause of sudden cardiac death. There is a need to get evidence for local population.

Objective: To determine the frequency of reperfusion arrhythmias in patients presenting with acute myocardial infarction.

Study design: Cross-sectional survey.

Study setting: Department of Cardiology, Jinnah Hospital, Lahore.

Duration of study: Study was conducted from 1st April to 30th September 2017.

Subjects and methods: A total of 315 consecutive patients admitted *via* emergency department with a diagnosis of myocardial infarction were enrolled. Patients were managed as per departmental protocol and eligible candidates were given thrombolytic therapy.

Results: 315 patients with mean age of 54.58 ± 10.18 years ranged from 40 to 75 were included. 164 patients (52.1%) had uncontrolled diabetes, 229 patients (72.7%) were male and 97 (32.3%) were female. 268 patients (85.1%) were given thrombolytic therapy. Out of total sampled population of 315, 43 patients (13.7%) developed reperfusion arrhythmia. Among them, 21 patients (6.7%) had VPCs, 8 (2.5%) had VT, 9 (2.9%) had VF, 5 patients (1.6%) had AIVR. There was no effect of age and gender on outcome. Patients with shock at presentation and thrombolytic therapy are at higher risk of developing reperfusion arrhythmia.

Conclusion: Reperfusion arrhythmia are common in myocardial infarction after thrombolysis. Patients with shock and thrombolytic therapy need more surveillance.

Keywords: Reperfusion arrhythmia; Ventricular tachycardia; Premature beats; Myocardial infarction

Introduction

About 30% of the total yearly deaths in developing world are due to cardiovascular disease (CVD) which is also the leading cause of mortality worldwide [1-4]. Acute Myocardial Infarction (AMI) shares a major portion of this death toll. Prompt diagnosis and treatment determine the outcomes of MI. In various studies, arrhythmias occurring during coronary perfusion have been analysed [5-7]. Those arrhythmias increase mortality risk. In addition to the arrhythmias observed in the acute phase of infarction, reopening of the infarct-related artery may increase the risk of arrhythmia even further and serious arrhythmias may appear known as reperfusion arrhythmias [5,7].

Thrombolytic therapy has changed the epidemiology of complications in patients with myocardial infarction [8,9]. A study was conducted to analyse the factors that predispose the occurrence of Ventricular Arrhythmia (VA) in young patients with a first acute myocardial infarction, which showed that the incidence of life-threatening VA with first attack of ST elevation acute myocardial infarction (AMI) was 8% [10]. Similarly, in a local study to evaluate the safety of most commonly used thrombolytic streptokinase in elderly patients presenting with acute myocardial infarction, arrhythmias were noted in the 6% of population [11]. "This frequency of arrhythmias is associated with thrombolytic therapy," has not been answered by available studies. The current study is planned to answer the question.

There is no local study available neither regarding the frequency of arrhythmias in patients presenting with acute myocardial infarction. A cross sectional study will be carried out to determine the link between thrombolytic therapy and development of reperfusion arrhythmias.

Results of this study may form the basis of future research. The results will also help to triage the patients for more intensive care.

Objective

To determine the frequency of reperfusion arrhythmias in patients presenting with acute myocardial infarction.

Materials and Methods

Study design

Cross sectional study.

Settings

Department of Cardiology, Allama Iqbal Medical College, Jinnah Hospital, Lahore.

Duration of study

April 1st to September 30th, 2017.

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Sampling technique

Non-probability/consecutive sampling.

Sample size

A sample size of 315 cases is calculated with 95% confidence level, 3% margin of error and taking the expected percentage of arrhythmias 8% in patients with acute myocardial infarction.

Inclusion criteria

- 20 to 90 years.
- Both male and female.
- Patient with first episode of STEMI presenting within 24 hours of chest pain.

Exclusion criteria

- Pt. already having arrhythmias at presentation.
- Patients with history of cardiac or thoracic surgery.
- Patients with advanced liver or kidney disease (AST/ALT>40 IU/L), Urea/Creatinine>Urea>200 mg/dl, Crt >1.3 mg/dl.
- Patients with thyroid diseases.
- Patients with previous history of arrhythmias.
- Patients with history of angiography or cardiac catheterization.
- Patients with cardiomyopathies.

Data collection procedure

A total of 315 consecutive patients admitted via emergency department, fulfilling the inclusion and exclusion criteria were enrolled in the study at Jinnah Hospital Lahore, after obtaining informed consent. A proforma was filled for each patient, designed to mention the patients' demographics (name, age, gender, admission number) and patients were managed as per departmental protocol and eligible candidates were given thrombolytic therapy. Treatment was noted down on proforma. Then patients were monitored in hospital for reperfusion arrhythmias (as per operational definition) 12 hourly until 72 hours. Thrombolytic therapy, if given, was noted.

Data analysis

Data analysis was done on software Statistical Package for the Social Sciences (SPSS) version 21. Numerical variables like age were presented by mean and standard deviation. Qualitative variables like gender and the presence or absence of reperfusion arrhythmias were presented as frequency and percentage. Data was further stratified for age, gender, presence and type of shock at presentation, uncontrolled diabetes and thrombolytic therapy to deal with effect modifiers. Post stratification, Chi Square test was applied to determine the level of significance. p value ≤ 0.05 was considered significant.

Results

A total of 315 Patients were included in sampled population with mean age of 54.58 ± 10.185 ranged from 40 to 75 years of age. The age of 233 patients (74%) was below 60 years while the remaining 82 patients (26%) were having age either 60 year or above. 229 patients (72.7%) were male while rest of the 86 (27.3%) were female. 164 patients (52.1%) had uncontrolled DM while the rest of the 151 (47.9%) did not. 268 patients (85.1%) had thrombolytic therapy. Thirty-six patients (11.4%),

out of total sampled population had cardiogenic shock at presentation. Out of total sampled population of 315, 43 patients (13.7%) developed reperfusion arrhythmia (Table 1). Arrhythmias was developed in 43 (14%) cases (Figure 1). When study population was distributed according to arrhythmia types, 21 patients (6.7%) had VPCs, 8 (2.5%) had VT, 9 (2.9%) had VF, and 5 patients (1.6%) had AIVR (Table 2).

When age groups were cross tabulated with arrhythmia, results came up as statistically insignificant when using the Pearson Chi-square test ($p=0.294$). Among the 43 patients with arrhythmia symptoms, 29 were below 60 years of age while 14 were either 60 years of age or above. When we cross tabulated gender and arrhythmia, results came

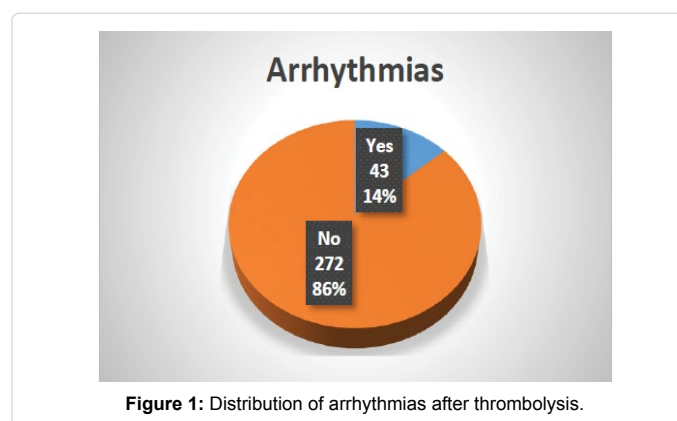


Figure 1: Distribution of arrhythmias after thrombolysis.

n	315
Age in years	54.6 ± 10.18
Age <60 years	233 (74%)
Age ≥ 60 years	82 (26%)
Male	229 -72.70%
Female	86 -27.30%
Uncontrolled DM	164 (52.1%)
Thrombolytic therapy	47 (14.9%)
Shock	36 -11.40%

Table 1: Baseline characteristics.

Arrhythmia	Frequency	Percent
Not applicable	272	86.3
VPCs	21	6.7
VT	8	2.5
VF	9	2.9
AIVR	5	1.6
Total	315	100

Table 2: Type of arrhythmia.

Variables	Arrhythmia		Total	p-value
	Yes	No		
Age (years)	<60	29	204	0.294
	≥ 60	14	68	
Gender	Male	36	193	0.081
	Female	7	79	
Uncontrolled DM	Yes	25	139	0.391
	No	18	133	
Thrombolytic therapy	No	12	35	0.01
	Yes	31	237	
Shock	Yes	20	16	0.001
	No	23	256	

Table 3: Comparison of arrhythmias in different strata.

up as statistically insignificant when using the Pearson Chi-square test ($p=0.081$). Among the 43 patients with arrhythmia symptoms, 36 were male while seven were female. When we cross tabulated thrombolytic therapy and arrhythmia, results came up as significant when we used the Pearson Chi square test ($p=0.01$). Among 43 arrhythmia patients, 31 patients had thrombolytic therapy. When we cross tabulated thrombolytic therapy and arrhythmia, results came up significant when we used Pearson Chi square test ($p=0.01$). Among 43 arrhythmia patients 20 patients had shock (Table 3).

Discussion

Death from a ventricular tachyarrhythmia in the setting of an acute myocardial infarction (MI) has historically been one of the most frequent causes of sudden cardiac death (SCD) [12]. In a 1985 report, 60 percent of deaths associated with acute MI occurred within the first hour and were attributable to a ventricular arrhythmia, ventricular fibrillation (VF) [13]. However, subsequent improvements in arrhythmia detection and treatment have had a major impact on the outcome of ventricular arrhythmias associated with acute MI. As a result, both arrhythmic and overall in hospital mortality from acute myocardial infarction (MI) have fallen significantly [14]. There is no local study available regarding the frequency of arrhythmias in patients presenting with acute myocardial infarction. A cross sectional study was carried out to determine the link between thrombolytic therapy and development of reperfusion arrhythmias. In our study, 43 patients out of 315 (13.7%) presenting with myocardial infarction developed reperfusion arrhythmia. Among them, 21 patients (6.7%) had ventricular PCs, 8 (2.5%) had ventricular Tachycardia, 9 (2.9%) had Ventricular Fibrillation, and 5 patients (1.6%) had accelerated idioventricular rhythm (AIVR).

This is like reports by previous studies. A study was conducted to analyse the factors that predispose the occurrence of ventricular arrhythmia (VA) in young patients with a first acute myocardial infarction, which showed that the incidence of life-threatening VA with first attack of ST elevation acute myocardial infarction (AMI) was 8% [10].

In the era of early percutaneous intervention, VT (especially non-sustained VT) remains common as shown by MERLIN-TIMI 36 study. Among patients with acute MI in the fibrinolytic era, the incidence of VF has ranged from 3.7 to 6.7% in large studies [15-18]. Almost like our study showing 2.9%. A review from the GISSI-2 trial evaluated 8676 patients with STEMI treated with thrombolytic therapy undergoing 24-hour Holter monitoring before discharge: 64 percent had at least one VPB per hour and 20 percent had more than 10 VPBs per hour. 18 which in contrary to our study which showed that only 6.7% people having VPC's.

Sustained monomorphic VT (SMVT) in the peri-infarction period (i.e., within the first 48 hours after the infarct) occurs in approximately 2 to 3 percent of patients with an ST elevation MI (STEMI) and less than 1 percent with a non-STEMI or unstable angina [19]. while in our study was 2.5% consistent with other studies.

Among the sampled population, 268 patients (85.1%) had thrombolytic therapy. When we cross tabulated thrombolytic therapy and arrhythmia, results came up as significant when we used the Pearson Chi square test (p value=0.01). Among 43 patients with arrhythmia, 31 patients had thrombolytic therapy (Table 3).

When we cross-tabulated shock at presentation and arrhythmia, results came up significant when we used the Pearson Chi square test ($p=0.001$). Among 43 arrhythmias patients, 20 patients had shock

(Table 3). Among the sampled population, 229 patients (72.7%) were male and 97 (32.3%) were female. There was no effect of age and gender on the outcome.

Conclusion

It is concluded that reperfusion arrhythmia is common after myocardial infarction. Patients with shock at presentation and receiving thrombolytic therapy need more surveillance.

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