

Frequency of Accelerated Idioventricular Rhythm in Patients with Acute ST Elevation Myocardial Infarction Receiving Thrombolytic Therapy

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ABSTRACT

Objective: To determine the frequency of accelerated idioventricular rhythm in patients with acute ST elevation myocardial infarction receiving thrombolytic therapy.

Study Design: Descriptive study

Place and Duration of Study: This study was conducted at the Cardiology Department District Head Quarter Teaching Hospital (DHQ-TH) Bannu from February 2020 to August 2020.

Materials and Methods: A Total 372 patient of ST Segment elevated myocardial infarction (STEMI) aged 25 to 75 years of both gender were enrolled following written informed consent. Streptokinase was used as thrombolytic therapy and accelerated idioventricular rhythm (AIVR) was noted.

Results: In our study total 372 patients were enrolled with the mean age of 53.8±11.9 years. There were 53.2% males and 46.8% females. The most frequent risk factor was Hypertension in 83.9% patients, followed by Diabetes Mellitus 65.6%. Accelerated Idioventricular rhythm was present in 45.2% patients.

Conclusion: We observed that AIVR is a common reperfusion arrhythmia after thrombolysis with streptokinase

Key Words: Myocardial infarction, reperfusion, ventricular arrhythmia

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INTRODUCTION

Myocardial infarction (MI) is the permanent loss of cardiac muscles caused by prolonged and an inadequate delivery of oxygen to the heart muscles.¹ It is caused by an imbalance in blood oxygen demand and supply owing to a variety of reasons, including plaque deposition and the formation of immovable thrombus in the coronary arteries that provide blood to the myocardium.²

In 2015, 15.9 million persons worldwide experienced a myocardial infarction, with more than 3 million having ST segment elevation and nearly 4 million having non-

ST segment elevation MI.^{3,4} Severe chest discomfort extending to the lower jaw and shoulder is a frequent sign of MI. Preexisting coronary artery disease (CAD),⁶ high blood pressure, diabetes, smoking, poor nutrition, and lack of exercise⁷ are all risk factors for MI. If the underlying reason is thrombus development in the coronary arteries, thrombolytic medicines are prescribed, which are administered intravenously to activate the fibrinolytic system in the blood, allowing plaques to be broken and blood flow to myocardial tissues to be restored.^{8,9} Streptokinase, reteplase, alteplase, and tenecteplase are the most frequent thrombolytics utilized in acute ST segment raised MI (STEMI).¹⁰ These medications are prescribed for individuals who have recently developed a STEMI and must be administered within 12 hours of the onset of symptoms in order to provide the most benefit to the patient.¹¹

Resolution of ST segment elevation, reduction in chest discomfort, and the emergence of specific arrhythmias, particularly accelerated idioventricular rhythm, have all been proven to be valuable non-invasive markers for detecting coronary reperfusion in Acute MI.¹²⁻¹⁵ Following fibrinolytic treatment, the AVIR is the most prevalent kind of arrhythmia, in the setting of STEMI.¹⁶ Accelerated idioventricular rhythm, defined as a ventricular ectopic rhythm with more than 3 consecutive beats and a rate between 50 and 120 bpm,¹⁷⁻¹⁸ is frequently observed during the reperfusion

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phase of acute myocardial infarction (AMI), and has therefore been proposed as a specific non-invasive marker for successful coronary artery reperfusion in the prethrombolytic and thrombolytic era.¹⁹⁻²⁰

Acute intervention in the presence of reperfusion has not been demonstrated to enhance clinical outcomes, and coronary angiography should be postponed in instances when noninvasive reperfusion signs are of sufficient predictive value.²¹⁻²² Emergency PTCA, on the other hand, is likely to be beneficial if coronary blood flow has not been restored. In Contrast if coronary blood flow has not been restored, emergency PTCA is likely to be helpful.²³

MATERIALS AND METHODS

Descriptive study conducted at the Cardiology department DHQ teaching hospital Bannu from 21st February 2020 to 20th August 2020.

Sample Size: Sample size is 372 patients, using 41% frequency of accelerated idioventricular rhythm in acute myocardial infarction receiving thrombolytic therapy, 95% confidence interval and 5% margin of error on WHO sample size calculator.¹⁷

Sampling Technique: Non probability consecutive sampling

Sample Selection:

Inclusion criteria:

- Patients who presenting with chest pain within 12 hours' duration and ECG show ST segment elevation of more than 2 mm in chest leads or more than 1 mm elevation in limbs leads.
- Either gender.
- Age 25 years to 75 years.

Exclusion criteria:

- Those having contraindications to thrombolytic (Contraindications: CVA, active bleeding, suspected case of aortic dissection, malignant intracranial malignancy, head trauma)
- Previous myocardial infarction
 - Left bundle branch block.

Data Collection Procedure: This study was being carried out after the approval of the hospital Research Ethical Committee in the department of cardiology DHQ-TH Bannu. The purpose and benefit of study was explained to patients and written inform consent was taken. Patients who fulfilled inclusion criteria were subjected to detail history and examination. Patients were monitored continually for 24 hours during and after infusion of thrombolytic (streptokinase) and appearance of accelerated idioventricular rhythm was noted. A twelve leads ECG was recorded by Fukuda Me C110 machine at standard paper speed of 25mm/second with 0.1 mm voltage representation standardization showing idioventricular rhythm. All information like age, gender, duration of disease, diabetes, hypertension and accelerated idioventricular rhythm was recorded using structured proforma.

Data Analysis: Data was analyzed using statistical package for social sciences version 16. Frequencies and percentages are calculated for categorical variables like gender, diabetes, and hypertension. Mean and standard deviation is calculated for numerical variables like age, duration of disease, accelerated idioventricular rhythm. Accelerated idioventricular rhythm is stratified among age, gender, diabetes, hypertension, and duration of disease in order to see effect modifiers. Post stratification chi square test is applied keeping p value < 0.05 as significant. Results are presented in tables and charts.

RESULTS

In our study total 372 patients were enrolled with mean age of 53.8±11.9 years (28-75). There were 53.2% (n, 198) males and 46.8% (n, 174) female patients Table 1. Hypertension and Diabetes was present in 83.9% (n, 312) and 65.6% (n, 244) patients, respectively.

Frequency of accelerated Idioventricular rhythm was present in 45.2% (n, 168) patients as shown in Table 1.

Table No.1. Baseline characteristics and Frequencies

Sr. No	Variable	Freq- uency	%age
1.	Male	198	53.2%
2.	Female	174	46.8%
3.	Hypertensive	312	83.9%
4.	Normotensive	60	16.1%
5.	Diabetes	244	65.6%
6.	Non Diabetic	128	34.4%
7.	Idioventricular Rhythm Present	168	45.2%
8.	Idioventricular Rhythm Absent	204	54.8%

Table No.2: Data stratification for age groups

		AIR		Total	
		Yes	No		
Age group	25-50 years	Count	75	66	141
		% within Age group	53.2%	46.8%	100.0%
	51-75 years	Count	93	138	231
		% within Age group	40.3%	59.7%	100.0%
Total		Count	168	204	372
		% within Age group	45.2%	54.8%	100.0%
p-value: 0.015 significant					

Age (p-value 0.015) and gender (p-value< 0.001), duration of MI (p-value 0.029) was significantly affecting the presence of AIR in the study subjects Table 2, 3 and 4.

Hypertension (p-value 0.978) and DM (p-value 0.255) was insignificantly associated with accelerated Idioventricular rhythm.

Table No.3: Data stratification for gender

			AIR		Total
			Yes	No	
Gender	Male	Count	48	150	198
		% within Gender	24.2%	75.8%	100.0%
	Female	Count	120	54	174
		% within Gender	69.0%	31.0%	100.0%
Total		Count	168	204	372
		% within Gender	45.2%	54.8%	100.0%

p-value <0.001 significant

Table No.4: Data stratification for duration of MI

			AIR		Total
			Yes	No	
Duration of MI	2-4 hours	Count	27	15	42
		% within Duration of MI	64.3%	35.7%	100.0%
	4-6 hours	Count	39	45	84
		% within Duration of MI	46.4%	53.6%	100.0%
	6-8 hours	Count	48	79	127
		% within Duration of MI	37.8%	62.2%	100.0%
	10-12 hours	Count	54	65	119
		% within Duration of MI	45.4%	54.6%	100.0%
Total		Count	168	204	372
		% within Duration of MI	45.2%	54.8%	100.0%

p-value: 0.029 significant

Table No.5: Data stratification for diabetes

			AIR		Total
			Yes	No	
DM	Yes	Count	105	139	244
		% within Diabetes	43.0%	57.0%	100.0%
	No	Count	63	65	128
		% within Diabetes	49.2%	50.8%	100.0%
Total		Count	168	204	372
		% within Diabetes	45.2%	54.8%	100.0%

p-value: 0.255 not significant

Table No.6: Data stratification for hypertension

			AIR		Total
			Yes	No	
HTN	Present	Count	141	171	312
		% within HTN	45.2%	54.8%	100.0%
	Absent	Count	27	33	60
		% within HTN	45.0%	55.0%	100.0%
Total		Count	168	204	372

	% within Hypertension	45.2%	54.8%	100.0%
p-value: 0.978 not significant				

DISCUSSION

We observed in the present study that majority of patients with Acute STEMI were elderly.

A total 372 patients were enrolled with mean age of 53.8±11.9 years. This is in consistent with previous research²⁴ that that onset of this disease is mostly common in the older age. The predominant gender was male (53.2% males and 46.8% females) suffering acute STEMI. The most frequent risk factor observed was HTN and DM (83.9% and 65.6%, respectively) in our study. Khan S has reported even more male (Male:Female, 1:1.9) with Acute Myocardial infarction and Hypertension and Diabetes was the most frequent risk factor in the older age acute STEMI group patients in local population.²⁵ Khan A et al also confirmed almost similar results with mean age of 59 ± 10.8, (68% male) and hypertension (n, 52), Smoking (n, 48) and diabetes (44) were the most frequent risk factor in elderly patients group.¹⁷

Frequency of AVIR in post thrombolytic patients with acute STEMI was observed in 45.2% (n, 168) in the present study. Khan et al reported AVIR 51% patients develop AIVR after thrombolytic therapy. Gressin et al²⁰ studied arrhythmias of ventricular origin during thrombolytic therapy administered for acute myocardial infarction using twenty-four-hour Holter monitoring in patients treated with streptokinase Ventricular arrhythmias were present in all patients. Tolerance was good (1 cardioversion for ventricular fibrillation). The incidence of AVIR was 90% with patent artery and 82% with non-patent artery. This frequency is almost double than our result which can be attributed to use of sophisticated holter monitoring as compared to random ECG monitoring done in our study. Wehren et al²⁶ found that AVIR was documented in 51% patients after thrombolytic therapy. These results are close to our results but it was done with small sample size of 110 patients.

In recent a study by Tatli et al²⁷ the incidence of AIVR in successfully thrombolysed patients was 73%. These all studies validate results of my study so my study can be used as reference study for taking AIVR as marker of reperfusion after thrombolytic therapy in the local population.

AIVR occurring in the first 6h were found significantly higher in patients with arterial patency and these arrhythmias were defined as non-invasive indicators of early coronary reperfusion.²⁸

CONCLUSION

To conclude, our study demonstrated the results that AIVR is the frequently recorded arrhythmia of

reperfusion during and or post thrombolysis with Streptokinase.

Author's Contribution:

Concept & Design of Study: Noshed Khan
 Drafting: Samiullah Khan, Naveed Danish
 Data Analysis: Muhammad Niaz Khan, Sadullah Shah, Raza Muhammad
 Revisiting Critically: Noshed Khan, Samiullah Khan
 Final Approval of version: Noshed Khan

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

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