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To determine the frequency of ST-Segment resolution after Streptokinase in acute STEMI Patients

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Abstract

1.1 Introduction

Acute Coronary Syndrome (ACS) is the umbrella term for the clinical signs and symptoms of Myocardial Ischemia: Unstable Angina, Non-ST-segment elevation myocardial Infarction, and ST-segment elevation myocardial Infarction.1Myocardial Infarction (STEMI) is defined as ST elevation on the ECG, which is the electrical manifestation of the pathophysiological changes that follow a thrombotic occlusion of an epicardial coronary artery. (3)

Analysis of ST-segment resolution on ECG, after fibrinolytic therapy, in cases of ST-Elevation myocardial infarction offers an attractive and cost-effective solution to assess coronary reperfusion. In a study, it is found that 61.5% of patients of STEMI showed ST-Resolution after an administration of Streptokinase. (6)

1.2 Objectives

The purpose of this study was to determine the frequency of ST-Segment Resolution after Streptokinase in acute STEMI patients.

1.3 Methods

It is a Cross-Sectional study, comprising a total of 92 patients who were recruited from the Emergency department of Tabba Heart Institute of Karachi, Pakistan based on Inclusion/ Exclusion criteria.

1.4 Results

The age range in this study was from 25 to 80 years with mean age of 54.9 ± 4.8. Out of 92 patients, 56(60.9%) were male and 36(39.1%) were female. Sixty patients (71.7%) were successfully resolved after Streptokinase in Acute STEMI patients while in twenty-six patients (28.3%) could not be resolved.

1.5 Conclusion

Sixty patients (71.7%) were successfully resolved after Streptokinase in acute STEMI patients while in twenty-six patients (28.3%) could not be resolved. Thus, Streptokinase could be a preferred therapy for thrombolysis in the STEMI Patients.

Keywords: *ST-elevation myocardial infarction, streptokinase, ST- segment resolution.*

Introduction

Acute Coronary Syndrome (ACS) is the umbrella term for the clinical signs and symptoms of Myocardial Ischemia: Unstable Angina, Non- ST-Segment Elevation Myocardial Infarction, and ST-Segment Elevation Myocardial Infarction. (1)

In the United States, Cardiovascular Disease is the leading cause and is responsible for 26% of deaths each year. Half of the deaths are due to heart disease. In 2009, the Center for Disease Control (CDC) estimated that 785,000 Americans had a new Myocardial Infarction and about 470,000 had recurrent attacks. (2)

ST-Elevation Myocardial Infarction (STEMI) is defined as ST Elevation on the ECG, which is the electrical manifestation of the Pathophysiological changes that follow a Thrombotic Occlusion of an epicardial coronary artery. (3)

Analysis of ST-segment resolution on ECG, after Fibrinolytic Therapy, in cases of ST-elevation Myocardial Infarction offers an attractive and cost-effective solution to assess coronary reperfusion.

Whereas Coronary Angiogram is a marker for epicardial reperfusion, ST-Segment resolution offers a better reflection of Micro vascular reperfusion. Although successful Thrombolysis of the epicardial vessel is necessary for a good prognosis, the micro-vascular flow more strongly correlates with the outcome. ST-segment is therefore a better indicator of prognosis and provides information, which cannot be assessed on basis of cardio angiogram alone. (4) Schroeder et al reported that the absence of ST-Segment Resolution was the most powerful independent predictor of early mortality (p = 0.0001). ST resolution can also be used as a tool to identify candidates for early invasive procedures such as PTCA, who are at risk of developing complications because of non-resolution of ST-segment after initial Thrombolytic Therapy. (5)

In a study, it is found that 61.5% of patients of STEMI showed ST-resolution after administration of Streptokinase. (6)

Thus, there is still much more work to be done, especially the prevention of its occurrence in the young population due to the unpredictable timing and relatively high risk of sudden death. In addition, complete myocardial perfusion to improve left ventricular function and survival is essential but may not be achieved in many patients due to multifactorial reasons and needs continued research for better long-term outcomes. Results of this study would also be helpful for other health care professionals. If the results of this study would show a high prevalence of ST-resolution after Streptokinase then management would be recommended in the future which could reduce chances of morbidity and mortality. Also, it would help arrange facilities to deal with such cases in emergency.

Materials And Methods

It is a cross-sectional study done at Tabba Heart Institute Karachi for One Year (July 8th, 2018 to January 7th, 2019). A total number of 92 patients were recruited for this study from emergency department, Tabba Heart Institute Karachi.

Taking the prevalence of ST-segment resolution in acute STEMI i.e. 61.5%, margin of Error d= 10% and 95% level of confidence. Sample size of n= 92.

3.1 Aims and Objectives of this study:

The primary objective of this study is to determine the Frequency of ST-Segment resolution after Streptokinase in acute STEMI Patients.

Methodology

Inclusion criteria:

1. Age between 25-80 years

2. Either gender

3. Diagnosed cases of ST-Segment Elevation myocardial infarction (as per Operational Definition) and receive Streptokinase upon presentation.

4. The patient was willing to provide consent.

Exclusion criteria:

1. Q-Wave myocardial infarction.

2. Severe cardiac failure.

3. Systolic blood pressure <90 mm HG.

4. Moderate to severe Valvular Heart Disease.

5. Active peptic ulcer disease.

6. Uncontrolled Hypertension.

All the above was assessed from the medical record.

4.1 Operational definitions:

Acute ST-segment elevation Myocardial Infarction (STEMI):

Presence of any two of the following: History of

1. Chest pain of fewer than 24 hours

2. Electrocardiography changes i.e. ST-Segment Elevation > 0.2mvin at least two contiguous limb leads.

3. New or presumably new left bundle branch block on electrocardiogram.

4. Troponin 1 > 0.30ng/ml.

ST-segment resolution:

A reduction of > 50% ST-Elevation from baseline after Streptokinase was labeled as positive.

History of smoking:

Consumption of at least two cigarettes per day for at least two years.

Diabetes Mellitus:

Documented history of type-2 Diabetes Mellitus of more than 2 years duration on treatment having HbA1c > 6.5 at presentation.

Hypertension:

Documented history of HTN of more than 2 years duration on treatment having to present SBP > 140 mm Hg.

Statistical Analysis

Data was entered and analyzed by using SPSS version 19.0. Mean and standard deviation was calculated for age. Frequency and percentage were calculated for gender, diabetes, hypertension, history of smoking, Family history of ischemic heart disease, and the outcome variable (ST-segment resolution). Effect modifiers were controlled through stratification of age, gender, diabetes, hypertension, history of smoking, and family history of ischemic heart disease. Chi-square/Fisher Exact test was applied to see the effect of these on outcome variables taken P≤ 0.05 was taken as significant.

Result

The age range in this study was from 25 to 80 years with mean age of 54.9 ± 4.8, shown in table no: 01. Out of 92 patients, 56(60.9%) were male and 36(39.1%) were female, shown in table no: 02.

44(47.9%) percent of patients of acute STEMI were diabetic, 58(63.1%) were hypertensive, 75(81.9%) were smokers and 42(46%) had a history of ischemic heart disease, shown in table no: 03-06.

Sixty patients (71.7%) were successfully resolved after Streptokinase in acute STEMI patients while in twenty-six patients (28.3%) could not be resolved, shown in table no: 07.

When results were stratified concerning age and hypertension, a significant difference was observed but when the outcome was stratified concerning gender, diabetes, and smoking, no significant difference was observed, shown in table no: 08-13.

When results were stratified concerning age, duration of the marriage, and BMI, a significant difference was observed, shown in table no: 07-09.

Age of	Mean	SD
	54.9	4.8

Table 1: Mean Age of the Patients

Gender	Frequency	Percentage
Male	56	60.9%
Female	36	39.1%

Table 2: Gender distribution of the patients (n=92)

Diabetes	Frequency	Percentage
Yes	44	47.9%
No	48	52.17%

Table 3: Frequency of diabetic patients in acute STEMI patients (n=92)

Hypertension	Frequency	Percentages
Yes	58	63.1%
No	34	36.9%

Table 4: Frequency of hypertensive patients in acute STEMI patients (n=92)

Smokers	Frequency	Percentages
Yes	75	81.9%
No	17	18.1%

Table 5: Frequency of smokers in acute STEMI patients (n=92)

Family h/o of ischemic heart disease	Frequency	Percentages
Yes	42	46%
No	50	54%

Table 6: Frequency of patients with a family history of ischemic heart disease in acute STEMI patients (n=92)

ST-segment resolution	Frequency	Percentages
Yes	66	71.7%
No	26	28.3%

Table 7: Frequency of St-segment resolution after streptokinase in acute STEMI patients (n=92)

Age groups	ST-segment resolution		P-value
	Yes	No	0.001
25-50	22	19	
>50-80	44	07	

Table 8: Stratifications of patients with St-segment resolution with respect to age

Gender	ST-segment resolution		P-value
	Yes	No	0.578
Male	39	17	
Female	27	09	

Table 9: Stratifications of patients with St-segment resolution concerning gender (n=92)

Diabetes	ST-segment resolution		P-value
	Yes	No	
Yes	32	12	0.840
No	34	14	

Table 10: Stratifications of patients with St-segment resolution concerning diabetes (n=92)

Hypertension	ST-segment resolution		P-value
	Yes	No	
Yes	47	11	0.010
No	19	15	

Table 11: Stratifications of patients with St-segment resolution concerning hypertension (n=92)

Smokers	ST-segment resolution		P-value
	Yes	No	
Yes	53	22	0.631
No	13	04	

Table 12: Stratifications of patients with St-segment resolution concerning Smoking status (n=92)

Family h/o ischemic heart disease	ST-segment resolution		P-value
	Yes	No	
Yes	31	11	0.686
No	35	15	

Table 13: Stratifications of patients with St-segment resolution concerning family history of ischemic heart disease (n=92)

Discussion

Streptokinase is secreted by streptococci. It was the first thrombolytic drug that was used for myocardial infarction. Although more than 80% of the global burden of cardiovascular disease is contributed by low-income and middle-income countries, Research and evidence of the importance of risk factors is largely derived from Developed Countries. (7) Therefore, the effect of such factors on the Risk of myocardial infarction in most regions of the world is unknown. Moreover, the time-related effects of Streptokinase required investigations.

Patients with AMI arrive at our hospital relatively rapidly due to its central location and most of the patients could utilize the maximum benefit of Thrombolytic Therapy because Streptokinase (SK) is cost-effective. Several modes of Reperfusion Therapy for evolving Myocardial Infarction (MI) have been developed which differ in terms of effectiveness, complexity, and cost. (7)

We used SK due to cost-effectiveness. Treatment of Acute STEMI with Thrombolytic Therapy showed greater mortality reduction. (8)

Thrombolytic Therapy with SK and other agents reduces mortality and is now well accepted as the mainstay of Revascularization options for most patients after an Acute Myocardial Infarction. (10)

Streptokinase is as efficacious as Alteplase (recombinant tissue plasminogen activator; Rt -PA), Anistreplase, Reteplase, and Saruplase in reducing mortality. (11)

Enoxaparin is superior to unfractionated Heparin, it also proved as Fibrinolytic Therapy with a combination of SK and the potent Anti-coagulant agent resulted in similar adjusted outcomes compared with more costly regimens utilizing a Fibrin-specific lytic. (11)

The SK regimen (1.5 MU/60 minutes) has remained unchanged for the past 20 years in patients with STEMI due to fear of Hypotension (a specific effect of this Thrombolytic Agent) and Haemorrhagic complications. (13)

Restoration of Infarct vessel patency has become one of the cornerstones of treatment for Acute ST-Elevation Myocardial Infarction. (14)

Intravenous Fibrinolytic agents are the most widely used means for the acute reestablishment of vessel patency, and their use has become routine as large clinical trials have shown their unequivocal benefits. (15)

Risk assessment based on clinical information, exercise stress testing, and an estimate of Left Ventricular function contribute to prognostic information in thrombolyzed MI patients. (16)

Thrombolytic therapy with SK is most effective if given within the first 1.5 hours after the onset of symptoms of Acute Myocardial Infarction. (17)

Determination of ST-Segment resolution 60 minutes after the administration of Thrombolytic Therapy allows accurate risk stratification for mortality and Congestive Heart Failure. (18)

Although primary Angioplasty should be the preferred treatment strategy when the inter-hospital transfer can be completed within 2 hours. (19)

In the present study, sixty patients (71.7%) were successfully resolved after Streptokinase in Acute STEMI patients while in twenty-six patients (28.3%) could not be resolved. while another study conducted in the US showed that ST-Segment was resolved in 87% of the Acute STEMI patients. (20)

7.1 Study limitations

The limitation of this study was as there was no Control Group so that no comparison could be made.

Conclusion

Sixty patients (71.7%) were successfully resolved after Streptokinase in Acute STEMI Patients while in twenty-six patients (28.3%) could not be resolved. Thus Streptokinase could be the preferred Therapy for Thrombolysis in STEMI Patients. Early recognition of Myocardial Infarction and then early Thrombolysis may also result in a successful Thromb1olysis.

Ethical Clearance

The data collection was started after approval from the CPSP. After taking approval from the Ethical Committee and Explaining the procedure, Informed Consent was taken.

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