



EVALUATION OF SAFETY AND IMPROVEMENT OF GLOBAL LEFT VENTRICULAR FUNCTION AFTER REPERFUSION THERAPY IN ACUTE MYOCARDIAL INFARCTION PATIENTS

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ABSTRACT

Early reperfusion has been shown to improve left ventricular function and survival after acute myocardial infarction. Anterior wall infarction carries a worse prognosis than inferior or lateral wall infarctions because it is more commonly associated with development of left ventricular failure and cardiogenic shock. In our study there are AMI

patients with low LVEF, ejection fraction can be improved by administration of thrombolytic. The purpose of this study is to compare the efficacy of improvement of LVEF more than 55%. In our observation we conclude that Reteplase has more effectively improves the ejection fraction than streptokinase. **Objective:** To evaluate the relation between improvements in global left ventricular ejection fraction during thrombolysis in acute myocardial infarction patients and their mortality and safety. **Methods:** This is an observational study involves a total number of 120 patients. Patients were diagnosed with Acute ST-segment elevation myocardial infarction (STEMI). Patients are allocated into two groups. Streptokinase and another reteplase received group. Based on ECG characteristics, AMIs are further categorized based on locations of infarctions as anterior, inferior, posterior, antero posterior, infero posterior wall myocardial infarctions. Thrombolytic was administered after receiving patient consent. The global LVEF was measured before and after thrombolysis by the expertise using echocardiography. A left ventricular ejection fraction of $\geq 55\%$ was considered a normal systolic function. The safety parameters such as anaphylaxis, cerebrovascular accident (CVA), hypotension, bleeding and mortality were observed among

those patients after thrombolysis. **Results:** A baseline 26 patients of < 55% of LVEF was noticed in SK group & 35 patients in RTP group. After thrombolysis improvement of global LVEF > 55% was observed only in 6 patients, out of 26 patients in SK group after thrombolysis. In RTP group baseline 35 patients are observed with <55% of LVEF, after thrombolysis with RTP > 55% of LVEF observed in 15 patients out of 35 patients those who have less than 55 % . That indicates there was significant improvement of LVEF > 55% observed in RTP received group and it was considered to be effective as compare with SK. Side effects and mortality is also less with RTP received group. **Conclusion:** Thrombolytics were administered within 6 hours of symptoms onset. Thrombolysis with RTP was significantly more likely to improve their global LVEF in patients with STEMI as compared with SK. By observing this findings we conclude that RTP was considered to be safe and effective.

KEYWORDS: STEMI, Thrombolytic therapy, LVEF, Echocardiography.

INTRODUCTION

Myocardial infarction is a common mode of presentation of ischemic heart disease. The WHO estimated that 12.6% of deaths worldwide were from ischemic heart disease. It is a medical emergency, and the leading cause of death for both men and women all over the world.^[1] Acute myocardial infarction is the result of a ruptured atherosclerotic plaque, causing thrombosis and occlusion of a coronary artery.^[2] Major attention has been focused on reperfusion therapy, which helps to restore coronary patency in acute ST- segment elevation myocardial infarction (STEMI) that leads to the preservation of left ventricular function and improves survival.^[3] Coronary angiography demonstrated that almost all cases of acute myocardial infarction were caused by thrombotic occlusion of coronary artery. This discovery has led to the development of therapies to restore coronary blood flow in occluded artery, which has dramatically reduced the morbidity and mortality associated with acute myocardial infarction.^[4] Thrombus often undergoes spontaneous lysis over the course of the next few days, although by this time irreversible myocardial damage has occurred.^[5] Anterior wall infarction carries a worse prognosis than inferior or lateral wall infarctions because it is more commonly associated with development of left ventricular failure and cardiogenic shock.^[6]

METHODS

This is a prospective observational study observed in intensive cardiac care unit (ICCU) of university hospital, Chennai, India. A total number of 120 patients with either sex were recruited and divided into two groups, as SK and RTP group. In both groups LVEF was observed before and after thrombolysis. The improvement of LVEF, safety parameters and mortality was recorded. A signed patient consent form was received before administration of Thrombolytics, such as Reteplase (brand name Mirel) 10 units IV bolus and 10 units as maintenance dose over 30 min; Streptokinase (brand name Cardiostrep) 1.5 million IU were used to restore the blood flow in occluded coronary artery, thereby improving the global ventricular ejection in acute myocardial infarction patients. Ventricular ejection was measured by using Toshiba Xario 200 operated by experts in ICCU. The safety parameters were recorded by observing the patients and their records.

RESULTS

In our study before thrombolysis there are 26 patients are observed with LVEF <55% among 60 patients in SK group and remaining 34 patients having LVEF > 55%. After thrombolysis with SK only 6 patients are noticed with improved LVEF > 55% out of 26 patients. In RTP group before thrombolysis 35 patients were observed with LVEF <55% among 60 patients of RTP group and remaining 25 patients having LVEF > 55%. After thrombolysis with RTP only 15 patients are noticed with improved LVEF > 55% in out of 35 patients. The thrombolytic therapy was done in both groups those who have less than and more than 55 % of LVEF in either groups irrespective of LVEF in AMI patients. The observed side effects after thrombolysis with SK in 60 patients we noticed anaphylactic reaction in two patients, one hypotension and two mortality cases were noticed after thrombolysis with SK in out of 60 patients. One mortality due to Cerebro vascular accident was noticed after thrombolysis with RTP out of 60 patients respectively. By observing both groups RTP shows more safe and effective as compare with SK.

Table No: 1 BASELINE CHARACTERISTICS.

	STK (n=60) %	RTP (n=60) %
GENDER WISE DISTRIBUTION		
Male	50 (83.33)	52 (86.66)
Female	10 (16.67)	08 (13.34)

AGE WISE DISTRIBUTION (Yrs)

< 39	05 (08.33)	02 (03.33)
40-49	13 (21.67)	11 (18.33)
50-59	14 (23.33)	23 (38.33)
60-69	20 (33.33)	16 (26.67)
70-79	08 (13.34)	08 (13.34)
Total	60 (100%)	60 (100%)

BMI RANGE (Kg/M²)

18-22 Normal	20 (33.33)	12 (20.00)
23-25 Overweight	10 (16.67)	06 (10.00)
26-30 Obese	28 (46.67)	34 (56.67)
31-35 Grade 1 Obese	07 (11.66)	03 (05.00)

CO MORBIDITIES

Type 2 Diabetes	29 (48.00)	24 (40.00)
Dyslipidemia	13 (21.67)	16 (26.67)
Hypertension	25 (41.67)	17 (28.33)
Acute renal failure	12 (20.00)	10 (16.67)
Family history of MI	15 (25.00)	12 (20.00)

SOCIAL HABITS

Smoking	13 (21.67)	18 (30.00)
Alcoholism	05 (08.33)	15 (25.00)

Table No: 2 COMPARISONS OF SAFETY & MORTALITY OF PATIENTS ON THROMBOLYTIC THERAPY.

	STK (n=60) %	RTP (n=60) %
Hypotension	01 (06.00)	00 (00.00)
Allergy (Anaphylaxis)	02 (12.00)	00 (00.00)
Bleeding	00 (00.00)	00 (00.00)
Cerebrovascular accident (CVA)	00 (00.00)	01 (06.00)
Mortality	02 (12.00)	01 (06.00)

Table No: 3 LVEF (> 55 % & < 55 %) BEFORE THROMBOLYSIS AT FIRST PRESENTATION OF ICU.

	STK (n=60) %		RTP (n=60) %	
	> 55 n (%)	< 55 n (%)	> 55 n (%)	< 55 n (%)
ECG characteristic				
Anterior wall MI	19 (31.66)	11 (18.33)	15 (25.00)	16 (26.66)
Inferior wall MI	04 (06.66)	09 (15.00)	08 (13.33)	12 (20.00)
Posterior wall MI	07 (11.66)	02 (03.33)	00 (04.25)	02 (03.33)
Anteroposterior wall MI	01 (01.66)	00 (00.00)	00 (08.52)	02 (03.33)
Inferoposterior wall MI	03 (05.00)	04 (06.66)	02 (03.33)	03 (05.00)
Total: n (%)	34 (56.66)	26 (43.33)	25 (41.66)	35 (58.33)

Table No: 4 IMPROVEMENT OF LVEF% IN THE PATIENTS WITH AMI AFTER THROMBOLYTIC THERAPY.

	STK (n=60) %		RTP (n=60) %	
	> 55 n (%)	< 55 n (%)	> 55 n (%)	< 55 n (%)
ECG characteristic				
Anterior wall MI	22 (36.00)	08 (13.33)	23 (38.33)	08 (06.38)
Inferior wall MI	06 (10.00)	07 (11.66)	12 (20.00)	08 (13.33)
Posterior wall MI	08 (13.33)	01 (01.66)	01 (01.66)	01 (01.66)
Anteroposterior wall MI	01 (01.66)	00 (00.00)	01 (01.66)	01 (01.66)
Inferoposterior wall MI	03 (05.00)	04 (06.66)	03 (05.00)	02 (03.33)
Total: n (%)	40 (66.66)	20 (33.33)	40 (66.66)	20 (33.33)

DISCUSSION

In our study the number of SK received patients are 60 (100%) among them 50 males (83.33%) & 10 female patients (16.17%). In RTP group the number of patients were 60 (100%) among them 52 male patients (86.66%) & 08 female patients (13.34%). Both groups are underwent for thrombolysis after the symptoms onset (Table no: 1). Thrombolysed time from the symptoms onset was less than 6 hours and door to needle time less than 40 minutes. The late reperfusion after failed thrombolytic therapy was associated with poor LVEF ⁽⁷⁾. There were 80 % of patients with either sex in between the age of 40-69 years; 13 % of patients with in 70-79 years and 7 % of patients in < 39 years were distributed among 120 patients with the mean age 59.5 ± 8.7 years., which was nearly similar to the second Euro

Heart Survey on acute coronary syndromes study^[8], while in other study (EUS) was found in men below 55 years.^[9] Whitlock G and Manson JE et al., observed that the association between overweight or obesity and ischemic heart disease is well established in their study.^[10,11] Acute myocardial infarction is more predominant in obese patients than normal weight patients in both groups in our study. M. K. Poulsen and R. R. Huxley et al., demonstrated that the diabetes mellitus is associated with an increased risk of cardiovascular death and a higher incidence of cardiovascular diseases.^[12, 13] In our study there are nearly fifty percent of patients with T2DM in both groups, particularly 29 patients of T2DM (48.00%) in SK group and 24 patients of T2DM (40.00%) in RTP group respectively. Therefore the prevalence of myocardial infarction is high in type 2 diabetics followed by hypertension and other co morbidities such as dyslipidemia, family history of MI and renal failure. Social habits such as smoking and alcohol are also risk factors likely to develop AMI in both groups (Table no: 1). Anaphylaxis (allergy) reaction was noticed in two patients and one death due to PVST in SK received group patients and another one death was noticed due to CVA in RTP received group patients. By comparing both groups in our study we conclude that thrombolysis with RTP group was safer than SK received group (Table no: 2). The LVEF > 55% was observed in 34 patients (56.66%) and LVEF <55% in 26 patients (43.33%) in SK group before thrombolysis and were considered to be as baseline (Table no: 3). The number of patients with LVEF <55% was reduced from 26 patients to 20 patients, the improvement was observed only in 6 patients after Thrombolysed with SK; which indicates mid improvement of LVEF > 55% is observed in SK received group, among 6 patients, improvement was observed in 3 patients of AWMi, 2 patient of IWMI and one patient of PWMI, and no improvement in other AMI types of, APWMI & IPWMI respectively in Thrombolysed patients of SK group (Table no: 4). The LVEF > 55% was observed in 25 patients (41.66%) and LVEF <55% in 35 patients (58.33%) in RTP group before thrombolysis and were considered to be as baseline (Table no: 3). The number of patients with LVEF <55% was reduced from 35 patients to 20 patients. The improvement was observed in 15 patients, among them the improvement was observed in the 8 patients of AWMi, 4 patients of IWMI and one patient in each of PWMI, APWMI & IPWMI respectively in the patients of Thrombolysed with RTP. That indicates there was a significant improvement of LVEF > 55% is observed in RTP received group (Table no: 4). By observing our study, the improvement of global LVEF <55% to LVEF > 55% was noticed in 15 patients, who receives RTP and only in 6 patients of SK received group. Schoming A et al., were observed that the poor left ventricular ejection fraction less than 30% was more in non TT recipient than TT recipient

patients and occurrence of left ventricular failure was more in non TT recipient^[14] and also McNamara RL et al., study showed that patients who received TT regimen have a slightly higher global ejection fraction and there is a curvilinear correlation between left ventricular ejection fraction and morbidity has been demonstrated for patient in both the pre thrombolytic and thrombolytic eras.^[15] Therefore we concluded that there was a significant improvement of LVEF > 55% was observed in patients who Thrombolysed with RTP group as compare with SK group.

CONCLUSION

Thrombolytic therapy is the cornerstone treatment for restoration of blood flow in occlusive coronary arteries and thereby improving global ventricular ejection in AMI patients. The findings include improvement of ventricular ejection noticed in 15 patients out of 35 in RTP & 6 patients out of 26 in SK group who have LVEF < 55% and other safety parameters such as 2 anaphylaxis reactions, one patient with hypotension and two mortalities were noticed in SK group & one death due to cerebro vascular accident were noticed in RTP group patient after thrombolysis. Observing above findings our study conclude that reteplase has more effective and safe as compare with streptokinase.

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Abbreviations

- AMI- Acute myocardial infarction
- ACE-Angiotensin converting enzyme
- ARBs- Angiotensin receptor blockers
- CVA- cerebro vascular accident
- ICCU- Intensive coronary care unit
- IV- Intravenous
- LVEF- Left ventricular ejection fraction
- LVF- Left ventricular failure
- MI- Myocardial infarction
- PSVT-Paroxysmal supraventricular tachycardia
- AWMI- Anterior wall myocardial infarction

IWMI- Inferior wall myocardial infarction
APWMI- Antero posterior wall myocardial infarction
IPWMI- Infero posterior wall myocardial infarction
RTP- Retiplase
SK- Streptokinase
STEMI- ST Segment elevated myocardial infarction
TT- Thrombolytic therapy

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