Original research article

Prospective observational study to assess the efficacy of IV streptokinase in acute STelevation myocardial infarction

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Abstract

Aim: to determine the efficacy of thrombolytic therapy with IV streptokinase in acute ST elevation myocardial infarction patients.

Methods: A prospective observational study was conducted in the Department of Cardiology, Indira Gandhi Institute of Medical Science, Patna, Bihar, India for 12 months. Total 90 Patients with diagnosis of acute ST segment elevation before and after thrombolysis with Streptokinase Were included in this study. Based on values obtained, study population divided into three categories. Category A: <30% resolution of the sum of ST segment elevation. Category B: 30%-70% resolution of the sum of ST segment elevation. Category C: >70% resolution of the sum of STsegment elevation.

Results: In the present study, the minimum age of the patient is 30 years, maximum age is 76 years. Maximum numbers of patients in between 40-60 years constitute 55%. Mean age of present study is 51.81±9.5. Male patients were significantly increased (77.78%) when compared with Female patients (22.22%). The chest pain was the most common mode of presentation, present in 84 (93.33%) patients associated with sweating in 79(87.78%) patients, breathlessness seen in 22 (24.44%) patients. Syncope was seen in 10 (11.11%) patients and palpitation in 5 (5.55%) patients. In this study anterior wall Myocardial infarction was not significant compared with inferior wall myocardial infarction.

Complete ST resolution seen among 40% cases, partial resolution seen among 45.55% and no resolution among 14.44% cases. Thrombolysis time of <3 hours, 3-5 hours and more than 5 hours was noted in a, b and c categories patients. B and c categories patients were significantly increased when compared with a categories patients.

Conclusion: In the present study we conclude that the efficacy of IV streptokinase for thrombolysis in acute STEMI is 40%. Patients with no resolution of ST segment 90 minutes following thrombolysis associated with more frequent adverse events and increased mortality compare to partial and complete resolution group.

Keywords: Acute myocardial infarction; ST segment resolution and thrombolysis

Introduction

ACS (Acute Coronary Syndrome) form the major part of cardiovascular deaths broadly classified into STEMI (ST elevated Myocardial Infarction) and NSTEMI (Non ST elevated Myocardial Infarction). STEMI results in complete occlusion of epicardial artery paving either PCI (Precutaneous Interventions) or fibrinolysis to be the effective therapy.[1-3] In conditions of emergency where it becomes difficult to perform PCI, fibrinolysis becomes the immediate solution to such STEMI patients preventing early deaths. Among the other fibrinolytics, Streptokinase is a non-fibrin selective fibrinolytic involved as a thrombus and

lysis, to restore supply to epicardial artery.[4,5] One in five middle aged adults are known to have an underlying CAD which could progress to MI. Most developing countries like India are expected to experience a sharp rise in Ischemic Heart Disease next to Infectious diseases. Initiation of fibrinolytic therapy immediately within some 0-3 hr brings down the short and long term complications by 15% and 25% respectively, but there is a hesitant in prescribing a fibrinolytic agent immediately. Unsuccessful reperfusion therapy with fibrinolytics could lead to its increased adverse effects causing complications. Thus time factor remains essential for success in reperfusion therapy. This reperfusion therapy with fibrinolytics not only compromises flow to epicardial artery but also enables microvascular flow monitored clearly with the help of ECG and not alone with cardio angiogram. 180 min is the expected time for Streptokinase rescue intervention.[6-8]

Clinical outcomes of fibrinolytic therapy would include resolution of elevated ST segment, relief from coronary pain, early Creatinine Kinase rise (CK-MB), development of reperfusion arrhythmias, T wave inversion from ECG. Minimum of 24 hr is required for T wave inversion and 12 hr for CK-MB peak.[9] Complete resolution could be defined as the reduction in >70%, partial resolution as the reduction of 30% to 70% and no resolution as reduction of <30% after 180 min of post thrombolysis in ST. PCI remains superior to fibrinolytic reperfusion but cost issues and other logistic reasons makes thrombolysis more effective and first priority. Management of MI in a developing country is still sparse due to non-availability of many resources, thus requiring strong primary prevention programs at the community level.[10-12] The aim of the present study to determine the efficacy of thrombolytic therapy with IV streptokinase in acute ST elevation myocardial infarction patients.

Material and Methods

A prospective observational study was conducted in the Department of Cardiology, Indira Gandhi Institute of Medical Science, Patna, Bihar, India for 12 month.

Methodology

Total 90 Patients with diagnosis of acute ST segment elevation before and after thrombolysis with Streptokinase Were included in this study. Patients with previous history of acute myocardial infarction patients coming to hospital after 12 hours of onset of symptoms, Patients with conventional contraindications for thrombolytic therapy, patients with previous history of valvular heart disease, cardiomyopathies and congenital heart disease. All the data were collected in a pre-tested proforma.

Based on values obtained, study population divided into three categories A, B and C

Category A: <30% resolution of the sum of ST segment elevation.

Category B: 30%-70% resolution of the sum of ST segment elevation.

Category C: >70% resolution of the sum of ST segment elevation.

Clinical details were recorded retrospectively, in hospital, major adverse events were defined as the occurrence of any of the following. Killip Class II-IV left ventricular failure, cardiogenic shock, recurrent angina, significant arrhythmias (which needs definite pharmacological, DC cardioversion and interventions like pacing) and death. Adverse events were divided according to timing <48 hours after admission and >48 hours after admission. An uncomplicated course was defined as no major adverse event during entire inpatient stay.

Results

In the present study, the minimum age of the patient is 30 years, maximum age. 76 years. Maximum numbers of patients in between 40-60 years constitute 55%. Mean age of present study is 51.81±9.5. (Table 1).

Table 1: Age Distribution of Patients

Age group(years)	Number of cases	Percentage	P-value
30-40	19	21.11	
40-59	50	55.56	0.003
60-74	21	23.33	

Table 2. shows that sex wise distribution of patients. Male patients were significantly increased (77.78%) when compared with Female patients (22.22%).

Table 2: Sex distribution of Patients

Gender	Number ofcases	Percentage	P-value
Male	70	77.78	0.000
Female	20	22.22	

In this study chest pain was the most common mode of presentation, present in 84 (93.33%) patients associated with sweating in 79(87.78%) patients, breathlessness seen in 22 (24.44%) patients. Syncope was seen in 10 (11.11%) patients and palpitation in 5 (5.55%) patients. (Table 3).

Table 3: Symptoms at presentation

Symptoms	Number ofcases	Percentage	P-value
Chest pain	84	93.33	0.0000
Sweating	79	87.78	0.0000
Breathlessness	22	24.44	0.0000
Palpitation	5	5.55	0.0000
Syncope	10	11.11	0.0000

Table 4: Type of Infarction

Type of infarction	Number of cases	Percentage	P-value
Anterior wall	54	60	
Inferior wall	36	40	0.178

In this study anterior wall Myocardial infarction was not significant compared with inferior wall myocardial infarction. (Table 4). Complete ST resolution seen among 40% cases, partial resolution seen among 45.55% and no resolution among 14.44% cases. (table 5). Thrombolysis time of <3 hours, 3-5 hours and more than 5 hours was noted in a, b and c categories patients. B and c categories patients were significantly increased when compared with a categories patients (Table 5).

Table 5: Symptom onset to thrombolysis time

Thrombolysis time	Categories		
	A	B	C
<3 hours	5	4	33
3-5 hours	0	16	5
>5 hours	8	16	3
P-value	0.029	0.000	0.000

Table 6: Outcome

Thrombolysis time	Categories		
	A	B	C
No adverse event	--	10	28
Adverse event excluding mortality	8	26	9
Hospital mortality	5	0	4

In this table no. 6 showed that the A, B and C categories of MI patients outcome. In No adverse events patients were significantly present in B categories compared with C and A categories patients. Adverse event excluding in hospital mortality were also significantly present in B categories patients compared with A and C categories but in hospital mortality were significantly present in A categories patients compared with B and C categories patients (table 6).

Discussion

The present study documents the usefulness of the standard electro- cardiographic ST segment resolution after 90 min following thrombolytic therapy as a predictor of coronary artery reperfusion. In our study the mean age of patients is 51.81 ± 9.5 which was concordant with the study done by Sezer et al, who also reported 58.2+11.2% of electro- cardiographic ST segment resolution.[13]

In this present study participated 90 acute ST elevation MI patients were included both male and female patients. Male patients were significantly increased (77.78%) when compared with Female patients (22.22%) which was concordant with Scroder et al.[14] French et al, and Dong et al, who reported males are commonly affected compared with Female.[15,16]

From the results obtained in our study it is clear that risk factors of smoking, hypertension, diabetes and prior angina was seen among Acute ST elevation MI patients students is 77.78%, 50%, 38.89% and 16.67% respectively. Which was similar with the previous studies conducted by French et al, Zeymer U et al, Dong et al, and Bhatial et al.[17,18] Base line variables in complete resolution group similar to other study groups, except for age and smoking. Patients in the present study are 10 years younger compared to other study groups. Percentage of smokers among population group of present study almost doubles that of other study groups.

Ratio of anterior wall myocardial infarction (60%) to inferior wall MI (40%)very high when compared to other study groups (Mean time of onset of symptoms to treatment also high in present study compared to other study groups (French et al, Zeymer U et al, Dong et al, and Bhatial et al.

Adverse events in complete resolution group in the present study are similar to other study groups. Arrhythmias are most frequent adverse events. In the present study group which can be comparable to other study groups. Followed by left ventricular failure. In hospital mortality is 10% in present study which is similar to other study groups.

Most frequent adverse event in no resolution group in the present study, LVF followed by cardiogenic shock. Even in other study groups LVF is the most frequent adverse event. But percentages of adverse events in the present study group are higher compare to other study groups.[19]

Conclusion

In this present study we conclude that the efficacy of IV streptokinase for thrombolysis in acute STEMI is 40%, and patients with no ST segment resolution at 90 minutes following thrombolysis were associated with more frequent adverse events and increased mortality

compared to partial and complete resolution group. Percentage of resolution of ST segment following 90 minutes of thrombolysis as a diagnostic test helps in risk stratification of patients

Reference

1. Gupta MC, Mehta L, Gupta SP. Clinical profile of acute myocardial infarction with special reference to risk factors-a five-year study. JAPI. 1989;37(1):55

2. Dwivedi S, Anupam P, Chaturvedi A. Cardiovascular risk factors in young coronary heart disease patients around East Delhi. South Asian J Prevent Cardiol. 1997;1:21-6.

3. Khan S, Abrar A, Abid AR, Jan T, Khan H. In hospital outcome of patients having acute myocardial infarction with and without streptokinase. Gomal J Med Sci. 2009;7(2):31.

4. Schroder R. Prognostic impact of early ST-segment resolution in acute ST elevation myocardial infarction. Circulation. 2004;110(21):506-10.

5. DeLemos JA, Braunwald E. ST segment resolution as a tool for assessing the efficacy of reperfusion therapy. J Am Coll Cardiol. 2001;38(5):1283-94.

6. DeWerf FV, Ardissino D, Betriu A, Cokkinos DV, Falk E, Fox KA, *et al*. Management of acute myocardial infarction in patients presenting with ST- segment elevation. European Heart J. 2003;24(1):28-66.

7. Jajoo U, Taksande B, Yelwatkar S, Kumar R. Resolution of coronary pain and settlement of elevated ST Segment after streptokinase thrombolysis in STEMI as a marker of prognosis. JMGIMS. 2011;16(1):60-3.

8. Anuj RV, Swapnil C, Kamble TK, Sourya A. Clinical Markers of Reperfusion in Patients with Acute Myocardial Infarction and its Prognosis Significance. International Journal of Recent Surgicals and Medical Sciences. 2016;2(2):90- 5.

9. Rolf S, Rüdiger D, Thomas B, Karl W, Thomas L, Ulrich T, *et al*. Extent of early ST segment elevation resolution: A simple but strong predictor of outcome in patients with acute myocardial infarction. Journal of the American College of Cardiology. 1994;24(2):384-91.

10. James AL, Eugene B. ST segment resolution as a tool for assessing the efficacy of reperfusion therapy. Journal of the American College of Cardiology. 2001;38(5):1283-94.

11. Nazif A, Kurthuluş Ö, Adnan A, Meryem UA, Mehmet AD. Mehmet AV, *et al*. Prevalence of risk factors of ST segment elevation myocardial infarction in Turkish patients living in Central Anatolia. The Anatolian Journal of Cardiology. 2009;9(1):3-8.

12. Ragupathy A, Nanda KK, Hira P, Hassan K, Oscar HF, DiAngelantonio E, *et al*. Hypertension in India: A systematic review and meta-analysis of prevalence, awareness and control of hypertension. Journal of Hypertension. 2014;32(6):1170-7.

13. Sezer M, Nisanci Y, Umman B, Yilmaz E, Olcay A, Erzengin F, et al. New support for clarifying the relation between ST segment resolution and microvascular function: degree of ST segment resolution correlates with the pressure derived collateral flow index. Heart. 2004;90(2):146-50.

14. Schröder K, Wegscheider K, Zeymer U, Tebbe U, Schröder R. Extent of ST-segment deviation in a single electrocardiogram lead 90 min after thrombolysis as a predictor of medium-term mortality in acute myocardial infarction. The Lancet. 2001;358(9292):1479-86.

15. French JK, Andrews J, Manda SO, Stewart RA, McTigue JJ, White HD. Early ST-segment recovery, infarct artery blood flow, and long-term outcome after acute myocardial infarction. Am heart J. 2002;143(2):265-71.

16. Dong J, Ndrepepa G, Schmitt C, Mehilli J, Schmieder S, Schwaiger M, et al. Early resolution of ST-segment elevation correlates with myocardial salvage assessed by Tc-

99m sestamibi scintigraphy in patients with acute myocardial infarction after mechanical or thrombolytic reperfusion therapy. Circulat. 2002;105(25):2946-9.

17. Zeymer U, Schröder R, Tebbe U, Molhoek GP, Wegscheider K, Neuhaus KL. Non-invasive detection of early infarct vessel patency by resolution of ST-segment elevation in patients with thrombolysis for acute myocardial infarction. Results of the angiographic sub study of the Hirudin for Improvement of Thrombolysis (HIT)-4 trial. Euro Heart J. 2001;22(9):769-75.

18. Bhatia L, Clesham GJ, Turner DR. Clinical implications of ST-segment non-resolution after thrombolysis for myocardial infarction. J Royal Soc Med. 2004;97(12):566-70.

19. Anderson JL, Marshall HW, Bray BE, Lutz JR, Frederick PR, Yanowitz FG, et al. A randomized trial of intracoronary streptokinase in the treatment of acute myocardial infarction. New Eng J Med. 1983;308(22):1312-8