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Research Article

A COMPARATIVE STUDY OF THROMBOLYTICS USED FOR THE TREATMENT OF STEMI IN A SOUTH INDIAN TERTIARY CARE HOSPITAL

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Abstract:

Background: ST segment elevated myocardial infarction is the most common cause of mortality and morbidity in worldwide; it occurs when thrombus formation results in complete occlusion of major epicardial vessel, thrombolytics was the first choice of treatment for STEMI along with other supporting therapies. **Objective:** To compare safety and efficacy of thrombolytics Streptokinase, Tenecteplase and Reteplase for the treatment of STEMI. **Methodology:** This is a prospective observational study conducted for a period of 6 months (November 2014 to May 2015) in RMMCH, Chidambaram. A total of 90 cases were collected. Study consist of three groups, group-1 (receiving streptokinase), group-2 (receiving Reteplase) and group 3 (receiving tenecteplase). Relevant data was obtained from case sheets before and after lysis and analyzed. **Result:** The study identified all three fibrinolytic drugs to be efficacious in causing > 50% resolution in ST segment, symptoms relief. Safety parameters were found to be fair in Reteplase group where no side effect was observed. Hypotension and cardiovascular arrest was observed in Streptokinase and Tenecteplase respectively. Efficacy was found to be high in Reteplase group with 93% of STEMI resolution and 93% of symptomatic relief where 83 % and 90% in tenecteplase and 83% and 86% in streptokinase groups. One death was reported in streptokinase and tenecteplase group respectively. **Conclusion:** Reteplase was found to be most safest and efficacious drug followed by tenecteplase and streptokinase.

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INTRODUCTION:

Myocardial infarction is a major cause of mortality and morbidity worldwide. More than three million people each year are estimated to have an acute ST elevated myocardial infarction and more than four million have a non ST elevated myocardial infarction [1]. Acute ST elevation myocardial infarction (STEMI) most commonly occurs when thrombus formation results in complete occlusion of a major epicardial coronary vessel. STEMI is the most serious form of acute coronary syndromes, which is a life-threatening, time-sensitive emergency that must be diagnosed and treated appropriately. A history of chest pain or discomfort lasting 10-20 minutes should raise the suspicion of acute STEMI in susceptible individuals (middle-aged male patients, particularly if they have risk factors for coronary disease)

Thrombolytic therapy is one of the major advances in the treatment of STEMI. Clinical trials have established the safety and efficacy of thrombolytic therapy in STEMI when administered within 12 hours of onset of symptoms, after carefully excluding contraindications; the earlier it is administered, more the benefit.[2]For the last 20 years thrombolysis has been used in the treatment of acute ST elevation myocardial infarction (STEMI) and has led to major outcome improvement [3].The 'first generation' thrombolytics had clinical disadvantages such as low specificity for fibrin, increased risk of allergic reactions (in particular with streptokinase) and short half-life. Newer thrombolytic agents such as Reteplase and tenecteplase have been developed with potential advantages that include: prolonged half-life, increased fibrin specificity and increased resistance to inhibition by plasminogen activators. However, these laboratory-measured advantages may not translate into measurable clinical benefits. For instance, the new thrombolytic drug lanoteplase was withdrawn from development as a result of an increased incidence of intracranial hemorrhage [4,5]. Thrombolytic treatment is not without adverse effects. Minor bleeding, hypotension, and allergic reactions are common in patients treated with Streptokinase [5].

METHODOLOGY

This is a prospective observational study conducted for a period of 6 months (November 2014 to May 2015) in RMMCH, Chidambaram. A total of 90 cases was collected, 30 cases for each group. Patient admitted with acute

STEMI is included in the study; Patients who have not treated with thrombolytics and Patients admitted with diagnosis of NSTEMI and unstable angina were excluded from the study. Study consist of three groups, group-1 (receiving streptokinase), group-2 (receiving Reteplase) and group 3 (receiving tenecteplase). Relevant data's were obtained from case sheets before and after lysis and analyzed. Chief complaint and symptoms were documented; Data were compared based on safety and efficacy parameters. Safety factors such as hypotension, bleeding, cardiovascular arrest and allergy were considered in the study. ST segment resolution > 50 % after lysis, reperfusion arrhythmias, symptomatic relief, and mortality was the factors which was used for comparing efficacy. The study was approved by the institution human ethics committee, Rajah Muthiah Medical College, Annamalai University (M18/RMMC/2015).

RESULT

The result was obtained from 90 patients. 30 patients from each group, the study population consist of 72 males (80%) and 18 females (20%) who have been admitted with STEMI in the CCU. The safety and efficacy were monitored for each group of patients who were administered with thrombolytics (streptokinase, Reteplase, tenecteplase) .The mean age of the population was found to be 62±18.The majority of the population lies in the age group of 60-70. Out of 90 patient's majority of them were smokers which account 75% followed by alcoholic 72% and tobacco users 67%. Table 1 shows Majority of the population was found to be in the age group of 60-70 followed by 50-60.

Table1: Age and gender wise distribution

Range	Sex		Total
	Male	Female	
30-40	2	1	3
40-50	14	3	17
50-60	25	5	30
60-70	28	6	34
70-80	3	3	6
Total	72	18	90

Table 2: Symptoms of STEMI

S. No.	Symptoms	N (%)
1.	Chest pain	85 (94)
2.	Dyspnea	73 (81)
3.	Giddiness	70 (77)
4.	Palpitation	69 (76)
5.	Others	65 (72)

Table 2 depict the most common symptom was found to be Chest Pain 94% followed by Dyspnea 81% and Giddiness 77%.

Table 3: Thrombolytics used in STEMI patients

S. No	Thrombolytics	No of Patients		N (%)
		Male	Female	
1.	Streptokinase	21	9	30 (33.3)
2.	Reteplase	19	11	30 (33.3)
3.	Tenecteplase	17	13	30 (33.3)

Table 3 shows fibrinolytics used for the patients out of 90, 30 were administered with Streptokinase, 30 were administered with Reteplase and 30 with Tenecteplase.

Table 4: Safety parameter of fibrinolytics

Safety Parameters	Thrombolytics					
	Streptokinase		Reteplase		Tenecteplase	
	No	%	No:	%	No:	%
Hypotension	5	16.6%	0	0	1	3%
Bleeding	0	0%	0	0	0	0%
Cardiovascular Arrest	1	3%	0	0	2	6%
Allergy	0	0%	0	0	0	0%

Table: 4 depict safety parameters of Thrombolytics, Hypotension was observed in 5 patients in Streptokinase and 1 patient in Tenecteplase group and cardiovascular arrest was observed in 1 patient in streptokinase group and 2 patients in tenecteplase group.

Table 5: Efficacy parameters of thrombolytics

Thrombolytics	Streptokinase		Reteplase		Tenecteplase	
ST Segment Resolution > 50% after lysed	n	%	n	%	n	%
	25	83%	28	93.3%	25	83%
Reperfusion Arrhythmias	1	3%	0	0%	0	0%
Symptomatic Relief	26	86%	28	93%	27	90%
Mortality	1	3%	0	0%	1	3%

Table: 5 shows ST segment resolution was attained in 25 patients in Streptokinase group, 28 patients in Reteplase group and 25 patients in tenecteplase group. Reperfusion arrhythmias was observed in 1 patient in streptokinase group and symptomatic relief was found in 26 patients in Streptokinase group, 28 patients in Reteplase group and 27 patients in Tenecteplase group. 1 death was seen in streptokinase and tenecteplase group respectively.

DISCUSSION

Fibrinolytics remain the primary treatment for STEMI along with percutaneous coronary intervention (PCI). A comparative study was conducted to assess the safety and efficacy of three thrombolytics Streptokinase, Reteplase and Tenecteplase. Out of 90 patients, 30 patients were administered with streptokinase, Reteplase, and Tenecteplase respectively. ST segment resolution of more than 90% is achieved in only Reteplase group where 28/30 patients were achieved. Thrombolytics especially Streptokinase has several side effects and limitations, higher rate of stroke and intra cerebral hemorrhage is seen [6]. Our study shows hypotension and cardiovascular arrest was the commonest side effect produced by the streptokinase, which is in 5 patients and 1 patient respectively. Streptokinase is the one of the most commonly using thrombolytics due to its free availability (in our study Centre) and less cost.

Today we have several generation of more modern fibrinolytics, handling gene engineering, recombinant tissue plasminogen activators, alteplase, Reteplase, Tenecteplase are synthesized, those new generation agents have lower antigenicity, much higher specificity for fibrin degradation. Alteplase has a short half-life and is administered only by intravenous infusion. Reteplase because of its longer half-life can be administered with a bolus therapy in patients with STEMI [7]. Our study shows that Reteplase produce more efficacies while compared to tenecteplase and streptokinase which produce ST segment resolution of >50 % for both streptokinase and tenecteplase.

CONCLUSION

This study was conducted to measure the safety and efficacy of Streptokinase, Reteplase and tenecteplase, while comparing safety parameters Reteplase shows much satisfactory level of safety compared to other two which does not produce any side effects while produced much highest efficacy with 93% of ST segment resolution compared to streptokinase and tenecteplase where 83% each. And symptomatic relief is also high in Reteplase while comparing safety and efficacy parameters its shows Reteplase> tenecteplase> streptokinase.

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