A Hospital Based Prospective, Observational, Cohort Study to Analyze the Incidence of Various Types of Arrythmias, Site Involved and Mortality in Consecutive Cases After Thrombolysis by Streptokinase within 24 Hours

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Abstract

Aim: To analyze the incidence of various types of arrythmias, site involved and mortality in consecutive cases after thrombolysis by streptokinase within 24 hours.

Materials and Methods: A hospital based prospective, observational, cohort study was conducted with 90 patients in the Department of General Medicine, Bokaro General Hospital, in Bokaro district of Jharkhand, India. Detailed history regarding chest pain, palpitation, sweating, vomiting, dyspnea, giddiness was asked, past personal and family history was asked. General and systemic examination was done. Information was collected through a pre tested and structured proforma for each patient. Cases was studied for arrhythmias complicating AMI, in terms of their incidence, timing, duration, severity, type, relation to the involved site, reperfusion and end result. Patient who showed arrhythmias on monitor, but whose arrhythmias couldn't be recorded on ECG paper due to the transient nature of the arrhythmias, was included in the study as a positive case. Patient having VF or any other arrhythmias, who died before recording could be done or in whom urgency of the situation prohibited the recording, was considered as positive cases of arrhythmias.

Results: The mean age of male and female patients was 54.39 ± 13.37 years and 56.55 ± 13.44 years respectively. The most common symptom was Chest pain (77.8%) followed by Sweating (61.1%), Dyspnea. 22 (24.4%) and 18 (20%) patients had hypertension and acute coronary syndrome respectively. The site of myocardial infarction in majority of the patients (57.8%) was anterior wall. The incidence of supraventricular arrhythmias was 6.6%. The incidence of ventricular arrhythmias was 44.4%. There were 10 (11.1%) cases of Right bundle branch block (RBBB). On analysis it was observed that in our study 25 (27.8%) patients died.

Conclusion: AMI occur in patients above 60 years of age and they are more common in males than in females. The most common arrhythmia after reperfusion with STK is ventricular tachycardia and least common is atrial ectopics.

Keywords: AMI, arrhythmia, STK

Introduction

In India, CVDs are responsible for more than 25% deaths. The Global Burden of Disease study estimate of age-standardized CVD death rate of 272 per 100 000 population in India is higher than the global average of 235 per 100 000 population. In line with WHO's Global action plan for the prevention and control of NCDs 2013-

2020, in 2015 India became the first country to develop specific national targets and indicators aimed at reducing the number of global premature deaths from NCDs by 25% by 2025[1]

Analysis of cross-sectional CHD epidemiological studies performed over the past 50 years reveals that this condition is increasing in both urban and rural areas. The adult prevalence has increased in urban areas from about 2% in 1960 to 6.5% in1970, 7.0% in 1980, 9.7% in 1990 and 10.5% in 2000; while in rural areas, it increased from 2% in 1970, to 2.5% in 1980, 4% in 1990, and 4.5% in 2000. In terms of absolute numbers this translates into 30 million CHD patients in our country[2]

There are two facets of CAD: Stable CAD and Unstable CAD which includes patients with acute coronary syndrome (Unstable angina, Non-ST elevation myocardial infarction, ST elevation myocardial infarction)[3]

Acute myocardial infarction (AMI) is myocardial necrosis in a clinical setting consistent with acute myocardial ischemia and detection of elevated values of cardiac biomarkers (CK-MB/troponin-I) above the 99th centile of the upper reference limit 4 hours after starting of symptom[4] Complication includes arrhythmic, mechanical, inflammatory sequel, about 90% develops some form of cardiac arrhythmia. In 25% patients, such rhythm abnormalities manifest within first 24 hours and risk of ventricular fibrillation is maximum in the 1st hour and declines thereafter[5]

In acute myocardial infarction (AMI), streptokinase and front-loaded alteplase regimens are commonly used for thrombolysis. Unfortunately, reperfusion is not always achieved, and the success of the therapy is limited by reocclusion. The balance between prothrombotic and thrombolytic processes can be shifted toward thrombolysis by administration of plasminogen activators; however,

procoagulant effects of such drugs have been reported. These side effects are important because of a procoagulant state in acute coronary syndromes. In patients with AMI and thrombolytic therapy, markedly increased thrombin activation was associated with failure to open the occluded coronary artery and with a high reocclusion rate[6]

As one pathway of thrombin stimulation of thrombolytics, activation of the contact phase of the coagulation by plasmin has been found in vitro. A recent clinical study measuring indirect plasmin markers proved the activation of the kallikrein-contact-phase system after streptokinase in patients with AMI, but no direct data on plasmin activation are available. Another pathway of activation of the kallikrein system may be the complement cascade[7]

Hence the present Prospective observational study was done at our tertiary care centre study to analyze the incidence of various arrythmias, frequency and type of arrhythmias in consecutive cases after thrombolysis by streptokinase within 24 hours.

Materials and Methods

A hospital based prospective, observational, cohort study was conducted with 90 patients in the Department of General Medicine, Bokaro General Hospital, in Bokaro district of Jharkhand, India,

Sample size calculation:

Dysrhythmias Induced by Streptokinase Infusion in Patients with Acute Myocardial Infarction Admitted to Cardiac Care Units in the Northwest of Iran was observed by Razieh Parizad. The study observed 87 (75%) patients had dysrhythmia. Taking this value as reference, the minimum required sample size with 10% margin of error and 5% level of significance is 73 patients. To reduce margin of error, total sample size taken is 90.

Inclusion criteria:

1. More than 18 years of age
2. Patients with documented Myocardial Infarction (MI) based on the following criteria: Third universal definition of myocardial infarction.
3. Detection of rise and/or fall of cardiac biomarkers (preferably cardiac troponin (cTn) with at least one value above the 99th percentile upper percentile limit) and at least one of the following:

- Symptoms of ischemia
- New or presumed new significant-segment T-waves (ST-T) changes or new left bundle branch block (LBBB)
- Development of pathologic Q waves in electrocardiogram (ECG)
- Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality.

Cardiac death with symptoms suggestive of myocardial ischemia and presumed new ischemic ECG changes of new LBBB but death occurred before cardiac biomarkers obtained.

Exclusion criteria:

- Patients < 18 years of age
- Patients with Congenital Heart Disease& conditions like Long QT Syndrome, Brugada, Arrythmogenic right ventricular dysplasia (ARVD) etc.
- Patients with valvular Heart disease
- Patients with electrolyte imbalance
- Patients on pro-arrhythmic medications which increase QT interval (QTc).
- Patients with a contraindication for thrombolysis

Methodology

Detailed history regarding chest pain, palpitation, sweating, vomiting, dyspnea, giddiness was asked, past personal and family history was asked. General and systemic examination was done. Information was collected through a pre tested and structured proforma for each patient.

The study was done on patients presenting with clinical features & ECG findings suggestive of ACUTE MYOCARDIAL INFARCTION.

In all the selected patients detailed history and physical examination was noted. Every patient was subjected to 12 lead ECG with serial monitoring. Diagnosis of arrhythmias was carried out as per AHA guidelines and treated accordingly. Every patient was put on Cardiac Monitor for 24 hours following thrombolysis by streptokinase in ICU were monitored.

The following investigation was carried out

- 12 lead-ECG
- 2D ECHO
- Serum Electrolytes
- Cardiac Markers
- Cardiac Monitoring
- Routine blood

Following standard treatment was given in Emergency:

Oxygen via mask, Analgesic such as Paracetamol, Diclofenac sodium, Tramadol. Anti-platelets and Vasodilators such as Sublingual nitroglycerine, Tab. Aspirin (600mg), Tab. Clopidogrel (300mg), Tab. Atorvastatin (80mg) was given according to the ECG findings.

Anticoagulant therapy such as low molecular weight heparin was given unless contraindicated.

Patients coming with cardiac failure and AMI treatment was inotropic support (e.g. Dopamine) and diuretics (e.g. furosemide) was started. ABC was secured in unconscious patients who came to ED with history of chest pain and ECG suggestive of Ischemia. Patient who came with Ventricular tachycardia or Ventricular fibrillation were given Defibrillation.

Patients coming with hypertension and AMI treatment were Sublingual nitrates, diuretics (e.g. furosemide),

antihypertensive medication was given according to clinical presentation.

Patient was defibrillated if patient has come with ventricular tachycardia or ventricular fibrillation.

Patient was attended by the cardiologist within 15mins of arrival patient was shifted from ED to CCU (within 10mins of arrival) on cardiac trolley with oxygen.

Reperfusion therapy was given with one of the following medication in
• Streptokinase: 1.5million IU (45ml NaCl) over 1 hour
Contraindications of reperfusion therapy

• Systolic BP 180 mm Hg, Hemodynamic instability which develops in individuals with NSTEMI, GI hemorrhage, Peptic ulcer, Abdominal Aortic aneurysm, Recent cerebrovascular accident, Known Intracranial aneurysm, Recent surgery within 2 weeks, and Financial constrain.

• Patients who did not receive reperfusion therapy because of contraindication, Anticoagulants, Antiplatelets and other supportive treatment were given.

• Patient was kept in CCU for a period of 2 days (or more in complicated cases).

Routine investigations were noted.

• Cases was studied for arrhythmias complicating AMI, in terms of their incidence, timing, duration, severity, type, relation to the involved site, reperfusion and end result. Patient who showed arrhythmias on monitor, but whose arrhythmias couldn't be recorded on ECG paper due to the transient nature of the arrhythmias, was included in the study as a positive case.

• Patient having VF or any other arrhythmias, who died before recording could be done or in whom urgency of the situation prohibited the recording, was considered as positive cases of arrhythmias.

Statistical Analysis

Quantitative data is presented with the help of Mean and Standard deviation. Comparison among the study groups is done with the help of unpaired t test as per results of normality test. Qualitative data is presented with the help of frequency and percentage table. Association among the study groups is assessed with the help of Fisher test, student's' test and Chi-Square test. 'p' value less than 0.05 is taken as significant.

Results

Table 1: Age and Gender Distribution of patients

Age (years)	Male		Female		Total		p Value
	N	%	N	%	N	%	
21-30 years	3	3.3%	3	3.3%	6	6.7%	
31-40 years	7	7.8%	1	1.1%	8	8.9%	
41-50 years	12	13.3%	5	5.6%	17	18.9%	
51-60 years	12	13.3%	10	11.1%	22	24.4%	
61-70 years	19	21.1%	10	11.1%	29	32.2%	
71-80 years	4	4.4%	4	4.4%	8	8.9%	>0.05
Total	57	63.3%	33	36.7%	90	100%	
Mean ± SD	54.39 ± 13.37		56.55 ± 13.44		55.18 ± 13.37		

The mean age of male and female patients was 54.39 ± 13.37 years and 56.55 ± 13.44 years respectively. The difference was statistically not significant as (p>0.05).

Table 2: Distribution of patients according to Symptoms and co-morbidities

Symptoms	N=90	%
Chest pain	70	77.8%
Sweating	55	61.1%
Dyspnea	40	44.4%
Vomiting	25	27.8%
Palpitation	10	11.1%
Epigastric pain	8	8.9%
Syncope / giddiness	7	7.8%
Pain in left arm	4	4.4%
Comorbidities		
Hypertension	22	24.4%
Acute Coronary Syndrome	18	20%
Diabetes Mellitus	7	7.8%
Dyslipidemia	3	3.3%

The most common symptom was Chest pain (77.8%) followed by Sweating (61.1%), Dyspnea (44.4%), Vomiting (27.8%), Palpitation (11.1%), Epigastric pain (8.9%), Syncope / giddiness (7.8%) and Pain in left arm (4.4%).

22 (24.4%) and 18 (20%) patients had hypertension and acute coronary syndrome respectively while 7 (7.8%) and 3 (3.3%) patients had diabetes mellitus and dyslipidemia respectively.

Table 3: Distribution of patients according to Site and type of arrhythmias

Site	N	%
Anterior	23	25.6%
Antero-lateral	15	16.7%
Antero-septal	14	15.5%
Inferior	26	28.9%
Inferior-lateral	7	7.8%
Inferior + right ventricular	2	2.2%
Inferior + posterior	1	1.1%
Inferior + anterior	1	1.1%
Sub-endocardial	1	1.1%
Types		
Ventricular tachycardia (VT)	22	24.4%
Sinus tachycardia	21	23.3%
Bundle branch block (BBB)	20	22.2%
Iº and IIº AV block (AVB)	17	18.9%
Complete Heart Block (CHB) (IIIº)	12	13.3%
AIVR	11	12.2%
Ventricular Premature Beats (VPB)	7	7.8%
Supraventricular Tachycardia (SVT)	3	3.3%
Atrial Fibrillation (AF)	2	2.2%
Atrial ectopics	1	1.1%

The site of myocardial infarction in majority of the patients (57.8%) was anterior wall [anterior (25.6%), anterolateral (16.7%) and antero-septal (15.5%)] followed by inferior wall (40%) [inferior (28.9%), inferior-lateral (7.8%), inferior and right ventricular (2.2%) and inferior and posterior wall (1.1%)]. 1 (1.1%) patient had both anterior as well as inferior wall infarction and 1 (1.1%) patient had sub-endocardial infarction.

The incidence of supraventricular arrhythmias was 6.6% with 3 (3.3%) cases of Supraventricular Tachycardia (SVT), 2 (2.2%) cases of Atrial Fibrillation (AF) and 1 (1.1%) case of Atrial ectopics. The incidence of ventricular arrhythmias was 44.4% with 22 Ventricular Tachycardia (VT), 7 (7.8%) cases of Ventricular Premature 11(12.2%) cases of AIVR. (24.4%) cases of Beats (VPB). There were 10 (11.1%) cases of Right bundle branch block (RBBB) while there were 7 (7.8%) and 3 (3.3%) cases of Left bundle branch block (LBBB) and Bifascicular block respectively.

Table 4: Distribution of patients according to Mortality

Mortality	N	%
Died	25	27.8%
Alive	65	72.2%
Total	90	100%

On analysis it was observed that in our study that 25 (27.8%) patients died.

Discussion

A hospital based prospective, observational, cohort study was conducted with 90 patients to analyse arrhythmias within 24 hours after thrombolysis by streptokinase in patients with acute myocardial infarction.

In the present study, majority of the patients (32.2%) were from the age group of 61- 70 years followed by 24.4% from the age group of 51-60 years, 18.9% from the age group of 41-50 years, 8.9% from the age groups of 31-40 years and 71-80 years and 6.7% from the age group of 21-30 years. The mean age of patients was 55.18 ± 13.37 years. 57 (63.3%) patients were male while female patients constituted 36.7% of the study group. The mean age of male and female patients was 54.39 ± 13.37 years and 56.55 ± 13.44 years respectively. The difference was statistically not significant as per Student t-test (p>0.05). This is similar to the studies of Rajhans R et al[8]Mhatre MA et al[9]Shah MJ et al[10]Hamid S et al[11]Taheri L et al[12]Hasan A et al[13]and Marangmei L et al[14]

Mhatre MA et al[9] prospective observational study analyzing the incidence, frequency and type of arrhythmias in relation to the site of infarction observed maximum incidence of AMI was in 41-70 years of age. Percentage of females is steadily rising from 41 years onwards and is equal to that of males in 71-80 years. There are only 5% cases below the age group of 40 years those too only males. Over all the number of male cases is highly significant (74%) as compared to females (26%).

The most common symptom in our study was Chest pain (77.8%) followed by Sweating (61.1%), Dyspnea (44.4%), Vomiting (27.8%), Palpitation (11.1%), Epigastric pain (8.9%), Syncope / giddiness (7.8%) and Pain in left arm (4.4%). This is comparable to the studies of Rajhans R et al[8]Mhatre MA et al[9]and Taheri L et al[12]

In our study, 22 (24.4%) and 18 (20%) patients had hypertension and acute coronary syndrome respectively while 7 (7.8%) and 3 (3.3%) patients had diabetes mellitus and dyslipidemia respectively.

This is concordant to the studies of Rajhans R et al[9]Marangmei L et al[14]and Hasan A et al[13]

It was observed in our study that 25 (27.8%) patients died. The study by Mhatre MA et al[9] reported morality in STK group (12.5%) was lower than mortality in non-STK group (55.5%). No mortality was seen in patients who received streptokinase and developed reperfusion arrhythmias depicting successful reperfusion.

Conclusion

AMI occur in patients above 60 years of age and they are more common in males than in females. The most common arrhythmia after reperfusion with STK is ventricular tachycardia (24.4%) and least common is atrial ectopics (1.1%). Other common arrhythmias are AIVR (12.2%), VPB (7.8%), bundle branch blocks and first degree AV blocks. The most common mode of termination is pharmacological.

Higher mortality was seen in those with later hospital presentation bringing out the importance of recognizing myocardial infarction, its associated complications, and the need for early presentation to the hospital for better patient outcome.

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