An Observational Study of Prehospital and Hospital Delay in Reperfusion for Acute Myocardial Infarction

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ABSTRACT

Introduction: Cardiovascular disease is the leading cause of death among Indian adults, and approximately 50% of deaths usually occur during the 1st hour after symptom onset before arriving at the hospital. Present study was planned to evaluate the prehospital delay in patients with acute myocardial infarction (AMI).

Maerial and methods: Prospective observational study was conducted on 200 patients with AMI admitted to the Department of Cardiology between August 2018 to July 2019. Detailed patient demographics, socioeconomic status, and prehospital were reviewed.

Results: The mean age of the patients with STEMI was 57.7± 11.9 years and in NSTEMI/UA was 62.9± 11.7 years. The study revealed that median prehospital delay time was 810 min with a mean of 746 min. In the Acute MI group (STEMI/NSTEMI) only 16.5% presented in emergency in <6 hours duration. Out of 200 patients in our study 6.7% STEMI patients were thrombolysed and in 76% patients PTCA was performed. In our study 6 patients were thrombolysed and 69 patients underwent PTCA who presented with STEMI. Data from our study suggest that the overall mean time from initial hospital presentation to receipt of fibrinolysis (Door to needle time) was 30.8 ± 10.5 min and to PPCI (Door to Ballon time) was 72.8 ± 15.4 min for patients with STEMI. A multivariate logistic regression analysis revealed that the prehospital delay was significantly associated with older age, female sex, rural background, diabetes, having atypical pain, and lack of knowledge regarding the seriousness of chest pain.

Conclusion: Prehospital delay was due to patient-related factors; old age, female sex, rural background, diabetes, atypical angina, and lack of knowledge being the significant attributes. D-N time and door-to-ballon time were almost within the limits of those recommended by current guidelines.

Keywords: Acute Coronary Syndrome, Prehospital Delay, Reperfusion, ST-Elevation Myocardial Infarction.

INTRODUCTION

In 2007, the American College of Cardiology and the European Society of Cardiology changed the definition of Acute Coronary Syndrome(ACS), traditionally incorporating only ST elevation myocardial infarction (STEMI), to include unstable angina and NSTEMI.[1] The prevalence of cardiovascular disease (CVD) is on the rise globally and accounts for 30% of deaths worldwide.[2] By the year 2020, India will have the maximum burden of CVD as compared to other countries.[3] CREATE registry, the largest data from Indian patients with ACS, has shown that the pattern of ACS among Indians is much different from that of the Western populations.[4] Of note, as many as 20% of patients admitted with NSTEMI may show no ECG changes; therefore, a lack of ECG changes in a patient presenting with chest pain is not enough to rule out ACS and further tests should be carried out.[5] The management and outcome of AMI patients depends on the degree and location of the obstruction. With a STEMI, the coronary artery is usually totally occluded and requires urgent pharmacological or interventional revascularisation (coronary angioplasty). With a NSTEMI, the coronary artery is usually partially blocked and patients require antithrombotic therapy and/or revascularisation.[6] Approximately 50% of acute MI (AMI) deaths usually occur during the 1st h after symptom onset before arriving at the hospital.[7] Every 30 min of delay increases the 1-year mortality risk by 7.5%.[8] Studies indicate that reperfusion interventions decrease the mortality by up to 25%–30%.[9] Despite these facts, a significant number of AMI patients have a delay in receiving treatment. This prehospital delay includes two time intervals, i.e., from the onset of the chest pain/symptoms to making a decision and from the patient's decision for medical help arriving at the hospital. The period between the onset of chest pain and the decision to seek medical help remains the most significant cause of the total delay. India, home to the world's second largest population, is a country with extreme diversity in terms of geography, race, culture, literacy, infrastructure and economy. All these factors pose serious challenges in the management of acute diseases like Acute Coronary Syndrome. In India, where prehospital paramedical support and ambulance services are generally not available, most patients reporting to the hospital use personal modes of transportation. Most of the peripheral

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hospitals lack facilities to record electrocardiogram. This, together with a preference to initially seek advice from a nearby practitioner, contributes significantly to the delay in presentation to hospital for definitive treatment of MI. We have old as well as recent data, especially the registries from different regions of India viz. Himachal Pradesh from North, Assam from North East (NE), Kerala and Chennai from South and multi- city, multi- hospital CREATE Registry.[10,11,12] The inferences are quite alarming: patients of acute coronary syndrome(ACS) in India have a higher proportion of STEMI as compared to developed countries. Most of these patients are from poor socio-economic status, have delayed presentation, are less likely to get evidence-based treatments and have greater 30-day mortality. Reducing the time to reach hospital and offering affordable optimal therapy could reduce morbidity and mortality.The present study was aimed to identify the prehospital and hospital delay and the factors contributing to the prehospital delay at a tertiary care hospital in Ambala.

MATERIAL AND METHODS

All patients admitted from the outdoor / in emergency ward / medical ward and cardiology unit in MMIMSR, Mullana from August 2018 – July 2019 with diagnosis of Acute Coronary Syndrome were taken up for the study. This Prospective Clinical Study was done to find out the total time taken by patient from onset of acute symptoms to presentation in a tertiary care centre and to find out the time delay between presentation of STEMI patients in a tertiary centre to coronary revascularization procedures. (Door to needle / Door to balloon time). (Door to needle / Door to balloon time). For the purpose of this study, delay was defined as a time interval >12 h from the onset of symptoms to the presentation

Sample size 200 Subjects.

Inclusion criteria

1. Patients must be more than 18 years of age.
2. Patients must fulfill the diagnostic criteria of ACS.

Diagnostic criteria of myocardial infarction is : if there is-
Typical rise and gradual fall of (troponin) or more rapid rise and fall (CK-MB) of biochemical markers of myocardial necrosis with at least one of the following:

a. Ischemic symptoms; like angina at rest.
b. Development of pathologic Q waves in atleast 2 ECG leads;
c. ECG changes indicative of ischemia (ST segment elevation or depression).

*Ethical clearance from institutional ethical commitee and written consent from patient was taken before the start of study.

Exclusion criteria

Patients who were initially treated elsewhere and referred to the study center only for additional management;
Patients with proven non-cardiac chest pain and
Patients who were discharged/ refused before completion of the treatment for any reasons.

STATISTICAL ANALYSIS

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 22.0 statistical Analysis Software. For finding the results of the study, numerical variables Mean, Standard deviation, range, minimum and maximum were calculated. Chi-square test and Student-t test were applied for non-parameteric variables.
Visualization of the results were made by using different type of graph bar charts.

RESULTS

A total of 200 patients with acute coronary syndrome were taken during the time period of 1 year (August 2018 – July 2019) of our study.
Table 1 shows the distribution of patients into STEMI, NSTEMI and Unstable Angina. Out of 200 patients 90 (45%) presented with STEMI, 56 (28%) presented with NSTEMI and 54 (27%) patients presented with Unstable Angina.
Table 2 shows the prehospital delay in presentation to hospital of patients with STEMI vs NSTEMI. Total no. of patients N-146 with steami no. of patients were N-90 and with nstemi no. of patients were N-56.Different time duration are given with the % of patients.
Table 3 shows the factors affecting pre-hospital delay in acute MI Age (>70years) factor have the p value of (0.021), transportation factor with different time duration have the p value of (0.018)and the others factors having different values of p

Treatment of patients presenting with STEMI

Table 4 shows treatment of patients with STEMI in relation to time delay in presentation.
In our study out of 90 patients with STEMI, 6 (6.7%) STEMI patients were thrombolysed, Coronary angiography was done in 78 patients, 5 patients had normal or non obstructive coronary vessels, 2 patients referred for urgent CABG, 2 patients refused PTCA due to personal reasons and in 69 (76%) patients PTCA was performed.Out of 69 patients who underwent PTCA, Pharmacoinvasive approach was used in 6 patients who received thrombolysis in peripheral centre and PTCA was done in 11 patients for Post MI angina who presented late (> 24 hrs after symptoms onset)
Thrombolysis was done in 3 out of 18 STEMI patients (16.7%) who presented within 6 hours, 2 out of 24 patients (8,3%) who presented within 6-12 hours delay and 1 patient out of 27 (3.7%) who presented with 12-24 hours delay.
PTCA was done in 15 out 18 STEMI patients (83.3%) who presented within 6 hours, 20 out of 24 patients (83.3%) who presented within 6-12 hours delay, 23 patients out of 27 (85.2%) who presented with 12 -24 hours delay and 11 patients out of 21 (52.4%) who presented late > 24 hours.
Patients who were not eligible for revascularization (thrombolysis / PTCA) in view of late presentation were kept on medical management.

Door to needle and door to balloon time (table 5)

In our study 6 patients were thrombolysed and 69 patients

Total no. of patients – 200	Number of patients	Percentage
Stemi	90	45%
Nstemi	56	28%
Unstable angina	54	27%

Table-1: Acute coronary syndrome patients in relation to subtypes

Time delay	Number (n-146) (%)	Stemi (N-90)	Nstemi (N-56)	P value
<6 Hours	24 (16.4%)	18(20%)	6(10.7%)	0.174^{Ns}
6-12 Hours	34 (23.3%)	24(26.6%)	10(17.9%)	
12-24 Hours	48 (32.9%)	27(30%)	21(37.5%)	
>1-7 Days	40 (27.4%)	21(23.4%)	19(33.9%)	

Table-2: Prehospital delay in presentation to hospital of patients with stemi vs nstemi

	>12 Hours (88)	<12 Hours (58)	P value
Age >70 years(n-22)	14(63.6%)	8(36.3%)	0.021
Transportation factor (n-53)	32(60.4%)	21(39.6%)	0.018
Treated at local hospital (n-74)	49(66.2%)	25(33.8%)	0.013
Atypical anginal pain(n-32)	18(56.2%)	14(43.8%)	0.031*
Onset at night(n-62)	40(64.5%)	22(35.5%)	0.008

Table-3: Factors affecting pre-hospital delay in acute mi

	Thrmbolysis (6)	PTCA (69)
<6 Hours (n-18)	3(16.7%)	15(83.3%)
6-12 Hours (n-24)	2(8.3%)	20(83.3%)
12-24 Hours (n-27)	1(3.7%)	23(85.2%)
>24 Hours (n-21)	-	11(52.4%)

Table-4: Intervention in patients with stemi in relation to time delay

	Door to needle time (6 Patients)	Door to balloon time (69 Patients)
Time in minutes	30.8 +/- 10.5 Min	72.8 +/- 15.4 Min

Table-5: Mean time of intervention in stemi patients

underwent PTCA who presented with STEMI.

Data from our study suggest that the overall mean time from initial hospital presentation to receipt of fibrinolysis (D-N time) was 30.8 ± 10.5 min and to PPCI (D-B time) was 72.8 ± 15.4 min for patients with STEMI.

DISCUSSION

Present study was carried out with the aim to study "Clinical Profile of patients presenting with Acute Coronary Syndrome (ACS) in a Tertiary Care Hospital". Study was conducted in Department of Cardiology. 200 patients with Acute Coronary Syndrome during the period of August 2018 – July 2019 were selected who qualified the exclusion and inclusion criteria and who gave consent for participation in study, Different parameters like gender, age, risk factors, echocardiography, Coronary angiography, intervention, outcomes were studied in subtypes of ACS. The study also evaluated time interval from symptom onset to presentation to a tertiary level hospital, time interval to reperfusion therapy and identifying the factors contributing to prehospital delay. A total of 200 patients with acute coronary syndrome were taken during the time period of 1 year (August 2018 – July 2019) out of which STEMI were 45% (90/200), NSTEMI were 28%(56/200), unstable angina were 27%(54/200). This finding is similar to that seen in study by Sharma et al[13] where STEMI is predominant. This is different from European studies where NSTEMI predominates.[14,15] The mean age of the patients with STEMI was 57.7± 11.9 years and in NSTEMI/UA was 62.9± 11.7 years. This shows that patient with STEMI were younger as compared to patients with NSTEMI/ UA. (p = 0.002). Mode of presentation, time of occurrence of the ACS, clinical course in the hospital, time to reach hospital, time until thrombolysis, treatments in hospital, the mean duration of hospital stay, and complications related to the ACS and its treatment were analysed. In the Acute MI group (STEMI/NSTEMI) only 16.5% presented in emergency in <6 hours duration, (20% of STEMI patients and 10.7% of NSTEMI).Maximum number of patients of acute MI (32.9%) presented in our tertiary hospital with 12-24 hrs delay after onset of symptoms. In our study 39.7% patients of acute MI presented to hospital < 12 hours, while 60.3% presented with a delay of more than 12 hours after onset of symptoms. The study revealed that median prehospital delay time was 810 min with a mean of 746 min. The prehospital delay was reported to a median of 300 min in CREATE registry,[4] The reason for delayed presentation include economic reasons, delay in transportation, higher proportion of rural patients, treatment from local health care provider which delay access to tertiary level hospital, distance to the hospital and atypical symptoms.Factors affecting pre hospital delay included old age > 70 years (63.6%), delay in transportation (60.4%), treatment at local hospital (66.2%) and those having atypical anginal pain or not recognising the symptoms as cardiac disease (56.2%) had significant delay > 12 hours in presentation to hospital from onset of symptoms. These factors had statistical significance < 0.05 in hospital

delay > 12 hours. 64.5% of patients with symptoms onset at night presented to hospital with delay > 12 hours. (p value < 0.001). In other studies also, these factors have been correlated with prehospital delay.[16,17] They also reported that onset of symptoms at night was associated with a delayed presentation. This relationship was also established in our study and was attributed to the unwillingness of patient to disturb other family members regarding his symptoms and less availability of transportation modes during night. There are several limitations of the present study. The effect of prehospital delay on disease outcomes was not studied. Patients who died of AMI outside the hospital and those with silent MI were not studied. Finally, it is not easy to extrapolate the results of this study to other areas of a country, in which the standards of medical practice are extremely heterogeneous. However, our data are representative of a typical tertiary care hospital, and therefore, such data can be generalized to other hospitals as well.

CONCLUSION

The prehospital delay was the main reason for not timely receiving reperfusion therapy. The main factors contributing to prehospital delay were old age, diabetes mellitus, poor knowledge of symptoms, atypical presentations, and unavailability of rapid transport facilities in rural areas. Patients often ignored their symptoms, self-medicated, and even when they decided to seek medical help, they consulted nonphysicians. To overcome these barriers, organized patient education, and awareness programs are urgently needed. Such programs should not only use methods such as public lectures, rural camps, and print materials but should also focus on television, the internet, and social media.

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