A Study of Prehospital Delay Patterns in Acute Myocardial Infarction in an Urban Tertiary Care Institute in Mumbai

Ashar Khan1, Milind Phadke2, Yash Y Lokhandwala3, Pratap J Nathani4

Abstract

Objective: There is now increasing awareness about the need for early diagnosis in patients presenting with chest pain. Pre-hospital delay remains a major hurdle in the institution of early reperfusion therapy, which is crucial in salvaging ‘at-risk’ myocardium and reducing adverse cardiovascular events following ST elevation myocardial infarction (STEMI). This study aims to determine the incidence and the determinants of delayed presentation STEMI and the potential impact of such delay on adverse cardiovascular outcomes.

Method: We prospectively evaluated all patients who were admitted in the emergency department of our hospital with STEMI from March 2014 to February 2016. Data was collected sequentially at the time of admission, discharge and during follow-up. Patients were evaluated with serial ECGs, continuous ECG monitoring and echocardiography.

Results: Out of 1386 patients with STEMI, delayed presentation was seen in 1148 (> 2 hrs) and 805 (> 4 hrs) patients. The duration from onset of symptoms to the presentation in the emergency room (pre-hospital delay) was 228 ± 341 minutes. The door to needle time was 34 ± 24 minutes. The major factors for pre-hospital delay were misinterpretation of symptoms (45%) and transportation problems (27%).

Conclusions: The problem of pre-hospital delay continues to remain a major hurdle in initiating timely reperfusion therapy in patients with acute STEMI. Lack of awareness and poor transportation facilities are the major contributors. It should be the goal of STEMI care programmes of the future to make a concerted effort to addressing these factors, in order to optimize the benefit of reperfusion therapy for this high risk group of patients.

Introduction

Acute STEMI is a major cause of mortality and morbidity worldwide. Most of the deaths (80%) occur within the first 24 hrs, of which the first hour is the most critical, contributing to 40 to 65% of the mortality. Half of these deaths are sudden and occur even before the patient has first medical contact. The in-hospital as well as long term mortality and risk significantly reduce with early reperfusion - either thrombolytic therapy or primary angioplasty. In a developing country like India, fibrinolysis with cost-effective agents like streptokinase (STK) continues to be one of the commonest modalities for reperfusion. Patients with STEMI are most benefited when thrombolytic therapy is administered early, especially within the first “Golden Hour” after the onset of symptoms; absolute mortality reduction is by 1% for every hour saved, and can be seen up to 6 hrs. Beyond the first few hours, benefit is significantly reduced. Yet, due to a variety of reasons, thrombolytic therapy is often instituted late during the course of treatment. The time interval between first onset of symptoms and the institution of reperfusion therapy is known as the total ischemic time. This has several components, including time for...
thrombolytic therapy administered elsewhere, ii) development of STEMI after hospitalisation, iii) unknown time of symptom onset and iv) LBBB. Using a standard questionnaire, information was sought regarding demographic characteristics, educational class, past history of ischemic heart disease, coronary risk factors, time of onset of chest pain, time between symptom onset and presentation to hospital, initial treatment given by primary attending doctor, events between chest pain and presentation to hospital, type of doctor consulted and mode of transport to the hospital. The door to needle time was calculated considering the time of admission to the time of starting STK, as documented in the indoor papers.

Statistical Analysis

Statistical analysis was done using SPSS software. The mean and median were calculated from the variables studied. Comparison of demographic and clinical characteristics were done using t test and Anova test; for the rest of the variables, t test, chi square test and mid p exact test were used; a p value<0.05 was considered to be statistically significant.

Results

A total of 1932 patients with STEMI were admitted during the study period. Of these, 1386 (973 men, 413 women) received STK. The remaining 546 patients met one or more of the exclusion criteria. Out of 1386 patients, only 234 (17%) patients were able to reach the hospital in less than 2 hours, whereas 333 (25%) patients reached between 2 to 4 hours after onset of symptoms (Figure 1). The pre-hospital delay was 228 ± 341 mins. A longer pre-hospital delay was found in women, patients > 55 yrs and diabetic patients. On the other hand, location of MI, time of presentation (day/night), hypertension and obesity were not found to be associated with delayed presentation.

Out of 234 patients who reached hospital in <2hrs, 103 (44%) patients came by their own transportation facilities and 131 (56%) patients came by an ambulance (p>0.05). Among the 1152 (83%) patients who reached the hospital after 2 hrs, 449 (39%) patients came by their own vehicle and 703 patients came by ambulance (Table 1). Presentation to hospital by an ambulance was not significantly associated with shorter pre-hospital delay. A medical consultation before coming to the emergency room was obtained in 882 (62%) patients, while 504 (36%) patients presented directly without any prior consultation. The main factors responsible for pre-hospital delay (Table 2) were misinterpretation of symptoms (45%) and transportation problems (29%).

Discussion

This study has attempted to analyse the magnitude and common reasons for pre-hospital delay in patients of STEMI presenting to a tertiary care hospital in the urban metropolis of Mumbai. There have been previous studies assessing pre-hospital delays in patients with STEMI from India.\textsuperscript{5,6} Xavier et al\textsuperscript{6} found only 58.5% of Indian STEMI patients received thrombolytics, with an average interval between symptom onset and hospital arrival (pre-hospital delay) of 5 hours, which was more than that of our study. This was twice as long as the median delay seen in the second Euro Heart survey.\textsuperscript{7} Increased pre-hospital delay in India has previously been attributed to poor patient knowledge about ACS, lack of emergency medical services (EMS) infrastructure, and transportation difficulties.

A major factor causing outdoor delay is lack of knowledge about symptoms of STEMI and denial of the disease both by patient and relatives. In our study, only 17% patients reached our emergency room within 2 hours. The slow pre-hospital delay, which is classified as pre-hospital delay (0-2 hrs) in the second Euro Heart survey,\textsuperscript{7} has been a major cause for in-hospital delay.

Method

This was an observational study conducted at a tertiary university hospital located in Mumbai. Data was collected prospectively of patients admitted in our institute with STEMI from March 2014 till February 2016. The diagnosis of STEMI was made on ECG showing ST segment elevation of more than 2 mm in two consecutive precordial leads, or more than 1 mm in two contiguous limb leads, with rise in cardiac troponins. The exclusion criteria were: i)
Factors Delay time (mins) N Mean±SD

Total 1386 228± 341

Sex
Male 1113 222± 312
Female 273 338 ±566

Age
< 55 years 567 184± 201
> 55 years 819 286± 398

Time of day
Day 1078 241± 352
Night 308 260± 217

Mode of transport
Ambulance 834 237± 482
Non-ambulance 552 262± 536

MI location
Anterior 933 235± 348
Non-anterior 453 272± 476

Hypertension
Yes 910 252± 290
No 476 229± 298

Diabetes
Yes 560 301± 202
No 826 207± 332

Smoking
Yes 506 239± 255
No 880 254± 389

Obesity
Yes 175 258± 257
No 1211 244± 389

Previous MI
Yes 126 238± 376
No 1260 244± 328

Prior consultation
Yes 882 264±460
No 504 123±273

Socioeconomic status
Upper (26-29) 42 230±580
Upper middle (16-25) 189 255±361
Lower middle (11-15) 427 241±560
Upper lower (5-10) 560 281±402
Lower (<5) 168 301±409

Table 1: Comparison of prehospital delay times by demographic and clinical characteristics

Table 2: Chief causes responsible for prehospital delay in study population

Chief Cause of Pre-hospital delay Number of Patients Percentage
Misinterpretation of symptoms 623 44.94
Delay during Transportation 396 28.57
Prior consultation 267 19.26
Financial reasons 60 04.32
Wrong initial diagnosis 24 01.73
No help available 16 1.1

Reasons for delay in women included not considering the symptoms to be serious, waiting for the symptoms to improve, not wanting to be a burden on anyone, finding it unpleasant or embarrassing to seek medical help. For the elderly, reasons for delay were mainly more limited access to medical care and failure to recognize or appreciate the symptoms of AMI. Silent ischemia or atypical symptoms often lead to diagnostic delays or errors in diabetic individuals - a phenomenon which is well recognized and documented in the literature.17

In our study, 834 (61%) patients arrived at the hospital by an ambulance and 552(39%) patients by other means of transport. Interestingly, presentation to hospital by an ambulance was not significantly associated with shorter pre-hospital delay. (p=0.14) Previous studies have found that patients presenting to the emergency room by an ambulance had shorter pre-hospital delay.14,19

One explanation for this finding could be that due to the anticipated traffic delays and availability of other tertiary care institutes, a sizeable number of patients presenting to us tended to be from localities relatively close to the hospital, and could therefore manage to arrange their own transport to reach the hospital.

The commonest cause of pre-hospital delay in our study was misinterpretation of symptoms (45%) followed by transportation problems (29%). Initial medical consultation was obtained in 62% - this can be a potential source of delay, especially if the first medical contact is not trained in recognising the symptoms and/or ECG findings of acute STEMI. In our study, 670 (49%) patients had consulted an allopathic doctor and 192 (14%) had consulted a non-allopathic doctor prior to presentation in the emergency department. Pre-hospital consultation was identified as a cause of significant delay in our study (p<0.001), thus increasing pain to door time.

According to the standard guidelines, an ECG should be obtained immediately within the first 10 mins of arrival to hospital in patients suspected to have suspicion of acute coronary syndrome, and the ideal door to needle time should be less than 30 mins.20 In our study mean door to needle time was 34 ± 24 mins and the average door to ECG time was found to be 16 mins, both of which were more than the recommended guidelines. In a study by Mohannan et al,21 less than one-third of STEMI patients who received thrombolysis had door-to-needle times more than 30 min. Door-to-needle time <30 min was associated with lower in-hospital mortality.22 The probable causes of these indoor delays are thought to be as follows: Indoor admission delay (time delay in OPD/IPD registration), indoor transport delay (lack of manpower, insufficient transportation carrier), delay in recording and interpretation of ECG. This indoor time delay can be reduced by starting thrombolytic therapy in the emergency room or in the pre-hospital setting in cardiac ambulances. The universal availability of cardiac ambulances with trained doctors and facilities for obtaining and electronically transmitting ECGs to an expert Cardiologist/physician - as is routinely done in several countries - can be a valuable way of achieving...
shorter ischemic times.

Conclusions

The present study demonstrated that pre-hospital delay continues to be a common phenomenon, thereby significantly increasing the total ischemic time with consequent increase in in-hospital mortality and morbidity. Misinterpretation of symptoms and transport delays continue to contribute the most to pre-hospital delays. Systems of STEMI care will have to focus on these variables to make a significant impact on patient outcomes in ST elevation myocardial infarction.

Limitations of the Study

This study has demonstrated the two commonest causes of pre-hospital delay - however, there can be many other reasons with more than one cause in a given patient – this needs further analysis. Inability to analyse and classify patient with multiple causes of delay has been mentioned as a limitation of the study. Second, it would be of interest to correlate the immediate and long term outcomes as a function of pre-hospital delay - however, this correlation is now well established and accepted in literature and hence was not the primary aim of conducting such a study.

References


