

# FACTORS ASSOCIATED WITH DELAYING OF FIBRINOLYTIC THERAPY ADMINISTRATION IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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## ABSTRACT

**Objective:** To evaluate the door-to-needle time for fibrinolytic therapy for acute myocardial infarction (AMI) and to identify factors associated with a prolonged door-to-needle time.

**Methodology:** This cross-sectional study was conducted at Cardiology Department, Lady Reading Hospital, Peshawar between 1<sup>st</sup> July and 15<sup>th</sup> September 2010. All patients having AMI, eligible for thrombolysis were included in the study. The time of onset of chest pain and arrival in the hospital and any reason for delay was determined by asking the patients, the relatives and/or the attending nurse.

**Results:** Out of 140 patients recruited, 60% (n=84) were males and mean age was 57.96 ± 13.55 years. The mean door to needle time was 72.47 ± 50.85 minutes (range 25 – 305). Door to needle time of < 30 minutes was achieved in 7.1% (10) patients, < 40 minutes in 21.4% (30) and < 50 minutes in 41.4% (58) patients. The main reason for delay in starting thrombolysis was logistic reasons in 42.9% (n=60) patients i.e. transfer from another hospital, non-availability of transfer staff from the casualty, unavailability of monitoring beds or non-availability of streptokinase in pharmacy. Other reasons were subtle ECG changes in 17.8% (n=25) cases, misinterpretation of symptoms in 21.5% (n=30), complete heart block needing pacemaker in 4.3% (n=6), raised blood pressure in 4.3% (n=6) and arrival in odd timing in 9.2% (n=13) cases.

**Conclusion:** Door to needle time of < 30 minutes was achieved in only a small minority of our patients. The main reason for delay was logistics.

**Keywords:** Acute myocardial infarction, Door to needle time, Fibrinolytic therapy.

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## INTRODUCTION

It has been well established that early intervention with thrombolytic therapy can reduce mortality and morbidity after acute myocardial infarction (AMI)<sup>1</sup>. Thrombolysis within the first hour can save an additional 65 lives per 1000 patients and a delay of four hours will reduce this to 25 lives per 1000<sup>1-3</sup>. The delay between the onset of symptoms and arrival in the emergency department may be many hours, with causes for delay being complex and multifactorial<sup>4</sup>.

Once in hospital, thrombolysis can further be delayed because of delay in assessment, re-assessment

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by a second doctor, or intrahospital transfer if the administration of thrombolysis is confined to a special area outside the emergency department<sup>5</sup>. Time to reperfusion plays an important role in myocardial salvage, and the concept of the “golden hour”, i.e. the optimal window for initiation of treatment (within 1 hour from the onset of pain), now appears to be applicable to all patients, including those treated by pharmacological reperfusion therapy<sup>6</sup>. Guidelines on STEMI recommend door-to-needle time of <30 min for fibrinolysis and door-to-balloon time of <90 min for primary angioplasty<sup>6</sup>. Analysis of the real-life context reveals that time to myocardial reperfusion often exceed recommendations<sup>7</sup>. A study conducted in Punjab Institute of Cardiology Lahore also evaluated the factors associated with delaying the administration of fibrinolytics therapy<sup>8</sup>. Since no such study has been conducted in our province so the rationale was to determine the factors associated with prolonging door-to-needle time. This study was conducted to evaluate the door-to-needle time for fibrinolytic therapy for AMI and to identify factors associated with a prolonged door-to-needle time.

## METHODOLOGY

This was a cross-sectional descriptive study of the patients who were thrombolysed with streptokinase for AMI at Cardiology Department, Govt Lady Reading Hospital, Peshawar between 1<sup>st</sup> July and 15<sup>th</sup> September 2010. All patients who were eligible for thrombolysis after AMI were included in the study regardless of the outcome. The time of onset of chest pain and the time delay till the arrival in the hospital was determined by asking the patient or/and attending relatives. The door to needle time was calculated from the first medical contact till the initiation of thrombolytic therapy. The reason for delay in the door to needle time was determined by asking the attending nurse, patients and/or relatives. Data was recorded on a proforma and expressed as percentages and mean  $\pm$  SD. SPSS version 15 was used to analyze the data.

## RESULTS

A total 140 patients who underwent thrombolysis with streptokinase for AMI were included. Males were 60% (84) and females were 40% (56). The mean age was  $57.96 \pm 13.55$  years, the mean age for males was  $58.19 \pm 13.72$  years and for females it was  $57.61 \pm 13.41$  years. The baseline characteristics are shown in Table I. As shown in Table II, Inferior MI was seen 42.9% (60), anterior MI in 37.1% (52), anterolateral in 14.2% (20), Inferior plus RV infarction in 2.9% (4).

The mean door to needle time was  $72.47 \pm 50.85$  minutes with minimal being 25 minutes and maximum as high as 305 minutes. Door to needle time of < 30 minutes was achieved in 7.1% (10) patients and door to needle time of < 40 minutes was achieved in 21.4% (30) and door to needle time of < 50 minutes was achieved in 41.4% (58) patients.

The main reason for delay in starting thrombolysis is grouped under the heading as logistic reasons in 42.9% (60) i.e. transfer from another hospital, non-availability of transfer staff from the casualty in off timings, unavailability of monitoring beds in CCU and non-availability of streptokinase in the hospital pharmacy. Another important reason for delay was misinterpretation of symptoms by 21.5% (30) patients. Another reason for delay was subtle ECG-changes, not typical of AMI which included those patients who cannot be thrombolysed straight away and had to be monitored with serial ECG and cardiac biomarkers before thrombolysis, this group had 17.8% (25) patients. Arrival of patients in off timings (after 2 pm), complete heart block needing pacemaker and raised blood pressure were also responsible for prolonging door to needle time (Figure 1).

There was also a decreasing trend in door to needle time seen when patients were attended in on-timings i.e. from 8am to 2 pm than in off-timings i.e. 2pm onwards. The mean door to needle time was  $57.64 \pm 23.12$  minutes in the on timings and  $79.34 \pm 54.32$  minutes in the off timings.

## BASELINE CHARACTERISTICS

Characteristics	N = 140
Age (years) mean $\pm$ SD	58.17 $\pm$ 13.7
Males	60% (84)
Female	40% (56)
Hypertension	44.3% (62)
Diabetes	30% (42)
Dyslipidemia	22.14% (31)
Smoking	19.3% (27)

Table I

## TYPES OF MYOCARDIAL INFARCTION

Type of Myocardial Infarction (MI)	Frequency (n=140)
Inferior MI	42.9% (60)
Anterior MI	37.1% (52)
Anterior lateral MI	14.2% (20)
Inferior plus RV infarction	2.9% (4)
Antero-Septal MI	1.4% (1)
New onset Left Bundle Branch (LBBB)	1.4% (1)

Table II

## REASONS FOR DELAY IN THROMBOLYSIS

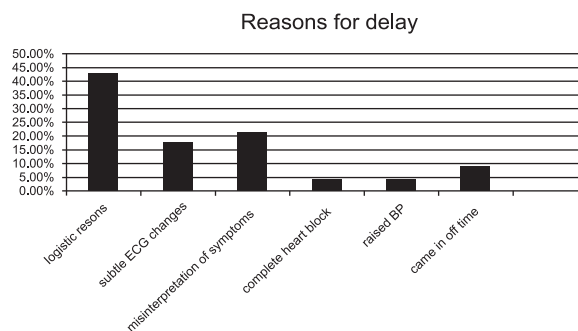


Fig. 1

## DISCUSSION

Although the medical and technological revolution in the last 3 decades has improved clinical outcomes in patients presenting with acute STEMI, residual morbidity and mortality are still high. Randomized controlled trials of fibrinolytic therapy have demonstrated the benefit of initiating treatment as early as possible after the onset of STEMI symptoms<sup>9,10</sup>. The time to treatment is a pivotal parameter in reperfusion. Patients treated within the 1<sup>st</sup> hour have the highest absolute and relative mortality ben-

efit<sup>11</sup>. By a team-based approach, significant improvement was seen in the measured time variables, with a mean door-to-needle time of 30 min. The time required for patient evaluation and ECG acquisition can delay the management of STEMI<sup>12</sup>. In-hospital delay has been shortened to 20-30 min by establishing special systems, such as emergency departments with special equipment and specifically trained personnel, and by allowing emergency physicians to administer thrombolytic therapy<sup>13</sup>.

In our study the mean door to needle time was  $72.47 \pm 50.85$  minutes. A study conducted by Zed et al at the Vancouver General Hospital showed that a door-to-needle time of <30 min was achieved in only 24.3%<sup>14</sup>. A study conducted in Punjab institute of cardiology showed a minimum time of 5 minute, while the maximum was 420 minute with mean time of  $55.13 (\pm 71.04)$  minutes<sup>8</sup>. Thus our time was comparable with study conducted in India and middle east<sup>15,16</sup>. In our study we achieved Door to needle time of < 30 minutes in 7.1% (10). The number of patient's thrombolysed within 30 minutes was lower than other contemporary studies, although some of them had smaller sample sizes<sup>8,14-18</sup>.

In our study the main reason for delay in starting thrombolysis was logistic-reasons (42.9%). Another reason is subtle ECG changes, which include patients who cannot be thrombolysed straight away and had to be monitored with serial ECG and cardiac biomarkers before thrombolysis (17.8%). These findings are favouring the results of Jahengir W et al which showed that subtle ST-segment changes in initial ECG was seen in 25% cases and delay in decision making and starting fibrinolytic therapy in 12% cases<sup>8</sup>. A study conducted in India by Masurkar et al noted the delay in taking or interpreting ECG and transfer to ICU were responsible for causing delay in getting the patients with acute myocardial infarction to be thrombolysed<sup>15</sup>.

There was also a decreasing trend in door to needle time seen when patients were attended in on-timings ( $57.64 \pm 23.12$  minutes) than in off timings ( $79.34 \pm 54.32$  minutes). This may be because of non accessibility of transport or unavailability of trained health care provider especially in rural area at late hours. In fact, some have demonstrated that provider delay accounts for more time lost than patient delay in the pre-hospital period.<sup>19</sup> Other studies have also shown similar results<sup>20,21</sup>.

## CONCLUSION

Door to needle time of < 30 minutes was achieved in only a small minority of our patients. The main reason for the delay was logistics.

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**AUTHOR'S CONTRIBUTION**

Following authors have made substantial contributions to the manuscript as under

**JI:** Conception and design, Acquisition of data, Drafting the manuscript,

**IH:** Acquisition of data

**MF:** Drafting the manuscript,

**MI:** Analysis and interpretation of data,

**AMG:** Critical revision,

**MH:** Final Approval of the manuscript

**CONFLICT OF INTEREST**

Authors declare no conflict of interest

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NONE DECLARED

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