Pain To Needle Time Of Thrombolysis For Acute ST Elevated Myocardial Infarction In A Tertiary Care Government Hospital, NICVD, Karachi, Pakistan

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Citation

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Abstract

Introduction: The salvage of myocardium after ST-segment elevated myocardial infarction is time dependent that is earlier the thrombolytic treatment started after chest pain better the prognosis. This pain to needle time and door to needle time have not yet been determined in our setup. Objective: To determine the pain to needle time (PNT) and door to needle time (DNT) of thrombolysis in patients with acute ST elevated myocardial infarction and to compare it with other international studies. Study Design: This descriptive analytical study consisted of 100 patients diagnosed with acute ST elevated myocardial infarction and selected for thrombolysis from emergency unit. The patients underwent clinical examination, routine investigations, questionnaire was filled and data collected. Results: The mean PNT was found to be 242 minutes far outside the ideal standard set by the ACC/AHA guidelines of 60 min. The mean DNT was found to be only 18 minutes, much better than recommended 30 minutes. Conclusions: The DNT was well within the recommended time, while the PNT in our patients was far greater than the recommended ACC/AHA guideline. The PNT can be reduced by encouraging other healthcare centers to give immediate thrombolytic therapy rather referring patients to our hospital; by increasing public awareness of the disease, especially immediate consultation in case of chest pain; and, lastly by developing a better system of transportation. Further studies are needed to determine the significance of these findings and to draw generalized countrywide conclusions.

INTRODUCTION

Cardiovascular diseases imposes the largest burden on health-care resources and is associated with higher numbers of illness, disability and death than any other disease1.It has also been shown that outcome of acute ST elevated myocardial infarction, specifically size of infarct and mortality, is directly related to the time between the onset of symptoms and the commencement of thrombolytic therapy that is the pain to needle time. The greatest improvement in survival is in the patients with shortest pain to needle time2, 3.

There are two main components of this PNT: (i) from the onset of typical chest pain to contact with health service (ii) time from the contact with the health service to thrombolysis, that is door to needle time (DNT). To achieve pain to needle time as short as possible health care providers are looking at systems that can provide public awareness for early consultation, rapid and efficient transfer of patients to hospital and methods that can reduce door to needle time. Changing the site of thrombolytic therapy from coronary care unit to emergency room, nurse initiated thrombolysis, out-of-hospital thrombolysis and various other methods implicated in different centre had shown very effective reduction in pain to needle time 4.

British Heart Foundation (BHF) guidelines recommend that patients with acute ST elevated myocardial infarction should receive thrombolytic therapy at less than 90 minutes after the onset of symptoms. The National Heart Foundation Australia (NHF) recommends that if it is not possible for patients to reach a hospital with facilities to deliver thrombolytic therapy within 90 minutes, out-of-hospital re-perfusion therapy should be considered 5. Joint Audit Committee of the British Cardiac Society and the Royal College of Physician recommend door to needle time to be less than 30 minutes. National Service Framework for Coronary Heart Disease (NSF) April, 2003 guideline recommends 75% of eligible patients should receive thrombolysis within 20 minutes of arrival at hospital 6, 7. National Institute of Cardiovascular Diseases (NICVD) is the largest, high volume tertiary care public hospital concerning heart diseases in Karachi, Pakistan. Main purpose of this study is to find out the percentage of patients

in our institute receiving thrombolytic therapy within the set guidelines.

OBJECTIVES

1. To determine the pain to needle time (PNT) of thrombolysis in patients with acute ST elevated myocardial infarction.
2. To determine the door to needle time (DNT) in patients with acute ST elevated myocardial infarction.
3. To compare these variables with other selected studies and with the ACA/AHA guidelines.

OPERATIONAL DEFINITION

Pain to needle time (PNT): From the start of typical chest pain (left sided chest heaviness radiating to arm, neck or jaw and or associated with sweating) to the start of thrombolysis (streptokinase) therapy in patients with acute ST elevation myocardial infarction or new onset left bundle branch block. It consisted of both the DNT plus the pre-hospital delay.
Door to needle time (DNT): From the time of entry in emergency room to the time of starting thrombolytic therapy in patients with acute ST elevation myocardial infarction or new onset left bundle branch block.

PATIENTS AND METHODS

In this descriptive analytical study, the study participants included 100 patients, including both genders, diagnosed as acute ST elevated myocardial infarction and selected for Streptokinase infusion for the first time, in the Emergency ward of National Institute of Cardiovascular Diseases (NICVD), Karachi, Pakistan, during the period from May 31, 2006 to Dec 1, 2006 (6 months). Patients who had Myocardial infarction in the past, developed acute ST elevated MI after admission, selected for primary Angioplasty, having contraindications to thrombolytic therapy or late arrivals (came in hospital after 12 hrs of typical chest pain) were excluded from the study.
Questionnaires were filled out during an interview with patients and included these variables; age, address, gender, risk factors, duration of typical chest pain, door to needle time, pain to needle time, mode of transportation and causes of delayed presentation to hospital. Routine examination and investigation like ECG, cardiac enzymes, complete blood count, random blood sugar, urea, creatinine and electrolytes was done.
Data analysis was performed through SPSS version 10. Mean plus minus SD, frequency and percentages was computed to present age, pain to needle time and door to needle time and also a comparison is done with other selected western studies. No statistical test was applicable for this descriptive study.

RESULTS

This study consisted of 100 patients out of which 19 were female and 81 were males. The age ranges between 30-90 years, mean age was 53yrs. The average door to needle time (DNT) was 18 minutes. The median time was 15 minutes (Table 1). The maximum amount of time taken to initiate thrombolytic therapy was 45 minutes (2% of patients), while the minimum time was 10 minutes, accounting for 17% of patients (Table 1 & 2). 97% of the patients had Door to needle time falling within the ACC/AHA guidelines of 30 minutes.
The mean chest pain to needle time (PNT) was 242 minutes (4 hours and 2 minutes). There was extreme variability with regards to the PNT, ranging from a minimum of 30 minutes up to a maximum of 690 minutes (11.5 hours) (table 1). Only 8% of the patients had PNT falling within the ACC/AHA guidelines of 60 minutes (1 hour) (Graph 1).
We also compared DNT, PNT and pre-hospital delay with that obtained by several studies in different western countries (Graph 2). In our study the median DNT was found to be 15 minutes (10-45), which as well within the recommended goal of 30 minutes determined by the ACC/AHA guidelines. Even when compared with different studies done in America, England, Germany, Finland and other developed countries, the DNT in our study was surprisingly the best. While the median PNT in our study was 210 minutes (30-690), being far greater than the ACC/AHA guidelines (60 mins.) as with the other developed countries as shown in graph 2.

Table 1

STATISTICAL ANALYSIS

STATISTICAL ANALYSIS

(Number of Patients = 100)

	Mean+- Std. Deviation	Median	Minimum	Maximum
Age of Patient(Years)	53.99+_12.40	52.00	30	90
Pain to Needle Time(min.)	241.80+_153.12	210.00	30	690
Door-to-Needle Time(min.)	18.15+_7.58	15.00	10	45

Table 2

DOOR - TO - NEEDLE TIME (MIN.)

DOOR - TO - NEEDLE TIME (MIN.)

(Number of Patients = 100)

Door to Needle Time (mins.)	Frequency of patients	Percent
10	17	17 %
15	48	48 %
20	15	15 %
25	3	3 %
30	14	14 %
40	1	1 %
45	2	2 %

Figure 1

PNT

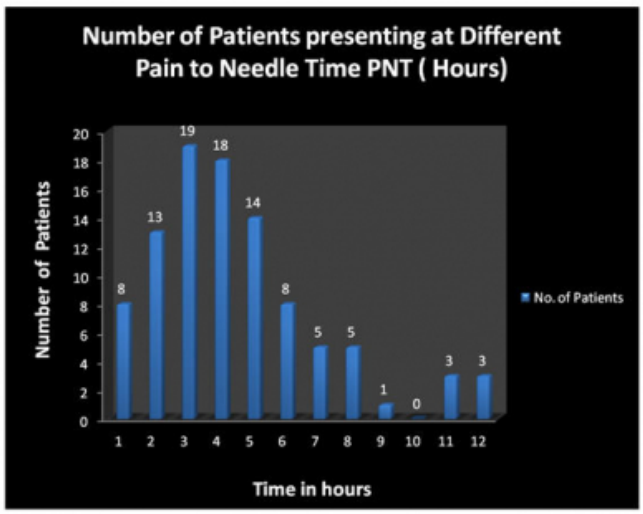
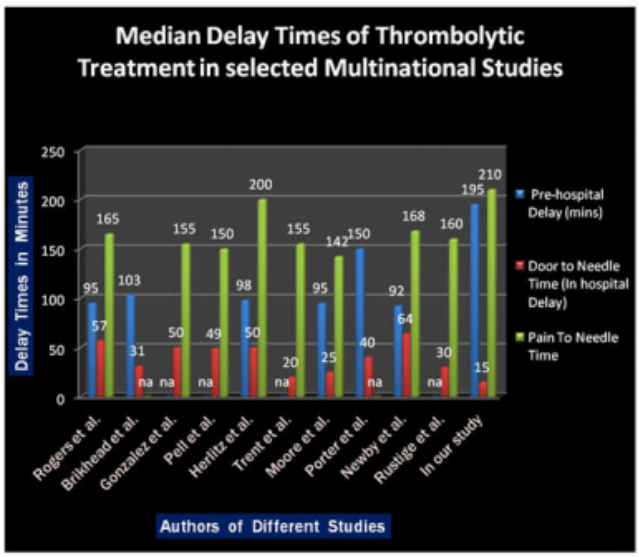


Figure 2

Delay times



Rogers et al.[12], Brikhead et al.[13], Gonzalez et al.[14],Pell et al.[15], Herlitz et al.[16], Trent et al.[17], Porter et al.[18], Newby et al.[19], Rustige et al.[20]

na= Data not available.

DISCUSSION

The interval between the onset of acute ST elevated myocardial infarction and the initiation of infarct-limiting therapy is a crucial prognostic factor, since even a relatively short curtailing of the delay in reperfusion has a major impact on survival 8. Several randomized controlled trials of fibrinolytic therapy have demonstrated the benefit of initiating fibrinolytic therapy as early as possible after onset

of ischemic-type chest discomfort9. Available data suggest that the time saved within the first one to two hours has greater biological importance than time saved during the later stages of STEMI 10. Although primary angioplasty may be superior in restoration of patency and in decreasing mortality, 11 thrombolytic drug treatments remains the cornerstone of reperfusion therapy in general practice.

In our study the door to needle time (DNT) and pain to needle time (PNT) was determined. The sample size consisted of 100 patients who fulfilled the inclusion criteria. We compared our DNT, PNT and pre-hospital delay with that obtained by several studies in different Western countries as mentioned in Table 4. In our study the door to needle time was found to be 15 minutes (10-45), which was well within the recommended goal of 30 minutes as determined by the ACC/AHA guidelines. Even when compared with different studies done in America, England, Germany, Finland and other developed countries, as mentioned in the table, the DNT in our study was surprisingly the best. A number of factors, unique to our hospital, may have contributed to the shortened DNT, included among them were:

1. Without undue formalities of registration and financial considerations, the patient had immediate access to the emergency doctors and thrombolytic therapy, as required.
2. The nursing staff immediately performed ECG as soon as the patient entered the emergency department, even before he/she was registered.
3. Nursing staff was highly experienced: they immediately alerted the duty doctor when they suspect ST elevation in ECG leads.
4. For all non-affording patients streptokinase injections were made available through Zakat Fund.
5. On-duty doctor immediately start Inj. Streptokinase after discussing with the senior most doctor.
6. A senior medical officer is present in the ER at all times, and decisions to thrombolyze were made in the ER without any other consultation.

Despite a very short DNT our patients have the longest delay in initiating thrombolytic therapy, the main cause of this delay lies outside the hospital that is the pre-hospital phase.

The pain to needle time (PNT) consisted of both the DNT and the pre-hospital delay. It reflects the total time from the onset of symptoms to the initiation of thrombolytic therapy. The median PNT in our study was 210 minutes (30-690), being far greater than the acceptable limit, i.e. up to 60 minutes according to ACC/AHA guidelines. Only 8% of patients had PNT within 60 minutes. This prolonged PNT delay was in contrast to our short DNT. When compared to the international spectrum of total treatment delay, our study ranked among those having the longest PNT. According to a comparison of several PNT reported in international journals, the median PNTs ranged from 142-200 minutes.12-14

In a Finnish study, the median interval between the onset of symptoms and the initiation of thrombolytic therapy (PNT) was 160 minutes (30-647). Only 13% of the patients received thrombolysis within 60 minutes and 25 % between 61 and 120 minutes after the onset of symptoms. The total treatment delay was more than 6 hours in 16% of the patients 15, similarly; in our study 17% of the patients had total treatment delay of more than 6 hours.

As mentioned previously, the increase in the pain to needle time observed in our country was mainly the result of late arrival in the hospital.

The most common cause for this delay was found to be: delay in referral from other healthcare centre, accounting for delay in 45% of our patients. This delay could be attributed to the fact that most other healthcare centre do not give thrombolytic therapy even after clear cut evidence of acute ST elevated myocardial infarction, but rather refer the patients. Few cases were even referred from private tertiary care hospitals, where they routinely give thrombolytic therapy, however thrombolytic therapy was withheld due to non-affordability of patients.

As even minutes matter, multiple action plans to reduce pain to needle time have been implemented in the West; including, pre-hospital fibrinolysis, nurse initiated fibrinolysis, and others 3.on the contrary, in our setup, even secondary care hospital are reluctant to give thrombolytic therapy and prefer to refer the patients. This results in loss of precious lifesaving time. The other common cause of late arrival found was patient and transport related.

Despite such excellent efficacy of our hospital staff in emergency even better than western hospitals, such a poor pain to needle time (PNT) is the result of lack of any effective policy and sense of responsibility in our public health care departments.

CONCLUSION

The mean door to needle time for acute ST elevated myocardial infarction in our study was only 18 minutes, shortest of available studies in the world. The possible explanation for this unexpected short door to needle time in our hospital is: (1) the mean time required for clinical

examination and 12 lead ECG in our emergency room is around 10 minutes. (2) The emergency medical officer/ cardiology fellow is authorized to administer thrombolytic therapy (even before the registration formalities are completed at admission counter). (3) The thrombolytic are readily available at emergency room (free of cost for non-affording patients).

The pain to needle time was unacceptably prolonged due to delay in the arrival of the patients to our centre which can be reduced by encouraging other healthcare centers to give immediate thrombolytic therapy rather referring patients to our hospital; by increasing public awareness of the disease, especially immediate consultation in case of chest pain; and, lastly by developing a better system of transportation.

Further studies are needed to determine the significance of these findings and to draw generalized conclusions for other parts of the country.

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