Original Article

Time to Hospital Evaluation in Patients of Acute Stroke for Alteplase Therapy

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ABSTRACT

Objective: To determine the time from onset of symptoms to hospital evaluation in patients with acute cerebro-vascular accidents to assess their eligibility for thrombolytic therapy.

Materials and Methods: This cross sectional observational study was carried out from March 2004 to September 2004 at the Department of Neurology, Military Hospital, Rawalpindi on 95 patients with acute cerebro-vascular accident. Patients of stroke presenting in outpatient and emergency department within 72 hours of onset of symptoms were included in the study. NIH Stroke Scale (NIHSS) was assessed at time of admission and all had CT scan. Time of onset of symptoms, arrival at ER/OPD to time taken by resident or neurologist in attending patient and time of getting CT scan were noted.

Results: Of 95 patients, 20 (21%) were hemorrhagic and 75 (79%) were ischemic in nature. Median time of arrival to hospital from onset of symptoms was 12hrs (range 1-72hrs). Median time taken by resident to attend patient was 10min (range 2- 30mins). CT brain was performed within 90min (range 10-390) after arrival in hospital. Arrival within
3 hours of symptoms was seen in 16 (16.8%) patients, 13 (13.7%) patients within 6hrs while 66 (69.5%) patients after 6hrs. When adjusted for hospital delay and excluding the patients with hemorrhagic infarcts, 4 (4.2%) patients arrived within 3hrs and were most appropriate candidates for thrombolytic therapy. There were 11 (11.6%) patients assessed within 6hrs while the majority 80 (84.2%) came after 6hrs.

**Conclusion:** Most patients with stroke do not reach hospital in time and are not suitable candidates for thrombolytic therapy. (Rawal Med J 2009;34:43-46).

**Key Words:** Stroke, cerebrovascular accident, thrombolytic therapy.

**INTRODUCTION**

Stroke is the third main cause of death and the leading cause of long term disability. In the United States alone approximately 750,000 strokes occur annually with mortality rate exceeding 150,000. In Pakistan, India, China, Nepal, Sri Lanka and Thailand there has been increase in stroke mortality due to increased risk factors and poor socioeconomic and health system. A National Health Survey carried out at Aga Khan University, Pakistan, identified 33% prevalence of hypertension in adult population, with 2 million diabetics and 20% population of smokers or tobacco users.

Despite the approval of thrombolytic therapy for ischemic stroke in 1996 by FDA, the number of patients benefiting from it have been small. Those benefited the most were who reported within a narrow “therapeutic window” limited to 3 hours only. However, only 1% to 2% of patients with ischemic stroke are estimated to be treated within 3 hrs in various centers with maximum of 5% in selected centers. Failure to reach the hospital in time is the main reason in majority of patients and therefore has been extensively
studied all over the world.\textsuperscript{9-14} In Pakistan, due to low level of awareness and general education, rampant alternative therapies and lack of adequate health transport system, the time to seek treatment is especially prolonged. Earlier local studies have shown pre-hospital delay of 6-9 hours in the majority of the patients.\textsuperscript{15,16} The objective of this study was to evaluate the time that patients take to reach hospital from the onset of symptoms and the emergency evaluation till the final diagnosis of stroke so as to assess the feasibility of thrombolytic therapy.

**MATERIALS AND METHODS**

This study was conducted at Military Hospital, Rawalpindi from 21\textsuperscript{st} March 2004 to 23\textsuperscript{rd} September 2004. Stroke was defined as “rapidly developing clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hrs or leading to death, confirming to a vascular territory and without other evident cause”. Patients with age >18 years and symptoms of less than 72 hours were included in the study. Those who had recurrent strokes were excluded from the study. Clinical diagnosis was established, NIHSS score was calculated and CT brain was performed in all patients. Time of onset was ascertained from patients or relatives. Symptom onset time was defined as the time when the patient first became aware of the symptoms. For patients who woke up with symptoms, time of onset was taken as time at which patient went to sleep and for those who were admitted unconscious; time of onset was taken as the last time they were witnessed to be well. Time of arrival to the hospital and time taken by a resident to attend the patient was endorsed on the predesigned proforma. Time of CT scan was noted from the record film.
Pre-hospital delay was defined as the time from onset of symptoms till arrival in the ER/OPD. In-hospital delay included time taken for visit by an internist and till the time CT scan is done. Total time delay included the pre-hospital and in-hospital time and was a measure of eligibility for thrombolytic therapy. Data was entered into SPSS v 10.0. Median time interval for both pre hospital and in-hospital delay was calculated with minimum and maximum range. The pre-hospital time was divided into three groups as patients arriving within 3hrs, within 6hrs and after 6hrs.

RESULTS

A total of 95 patients fulfilled the inclusion criteria and 79% were males and 21% females. Mean age was 62 years (range 34-85). Ischemic stroke was more common (78.9%) as compared to hemorrhagic stroke (21.1%). Most of the patients were brought to hospital in a taxi (67.4%) as compared to ambulance (14.7%) or private car (17.9%). The median pre-hospital delay time was 12hrs with a range of 1 to 72hrs. Mean pre-hospital delay was 19hrs. Approximate 17% arrived to hospital within 3hrs, 14% arrived within 6hrs and rest of the subjects (69%) came after 6hrs (Figure 1).

Fig 1. Pre hospital time delay in patients with stroke (n=95).
The median time delay to attend by a resident was 10 min with a range of 2 min to 30 min. Mean time delay was 12 min. CT scan brain was performed with a median time delay of 90 min with range from 10 to 390 min. Mean time interval was 117 min (approx 2 hrs). When adjusted for in-hospital delay and excluding the patients with hemorrhagic stroke who arrived early, patients with a total delay time of less than 3 hrs were only 4.2%, as compared to those who arrived in less than 6 hrs (11.6%). Patients coming later than 6 hrs were 84.2% (Figure 2).
This reflects that although 17% of patients arrived within 3 hrs yet only 4.2% were true candidates for thrombolytic therapy and out of the rest 12.8%, 4.2% had hemorrhagic stroke while 8.6% accounted for in-hospital delay.

DISCUSSION

Studies of cerebral blood flow measurement based upon Kety-Schmidt principle have revealed that after occlusion of an artery there is region of brain that is threatened but viable and it was termed the “ischemic penumbra” and the time this zone would remain viable was called “therapeutic time window”. Though degree of occlusion, presence of collaterals and extent of spontaneous reperfusion can vary, animal studies have
consistently shown that reperfusion within 3 hours of arterial occlusion will limit the size of infarct and improve the outcome.\textsuperscript{17} This scientific dictum has given origin to the concept of “time delay” which has been defined as time it takes from stroke onset to initiation of acute medical intervention. As the first step, we have tried to establish delay time in our community. Around 17\% of patients arrived within 3 hours and further 14\% arrived within 6 hours of onset of symptoms, a result which is far from ideal.

The mean pre-hospital delay in the present study was 5.4 hours with a total of 56\% patients arriving within 3 hours. This time lapse is similar to earlier studies by Basharat et al\textsuperscript{15} and Siddiqui et al\textsuperscript{16} in Pakistan. The mean time delay for CT scan in Genentech Stroke Presentation Survey was 1.9 hours.\textsuperscript{18} A similar result was reported by a UK based study which identified that 37\% patients reported within 3 hours and 50\% in 6 hours.\textsuperscript{19} Stroke unit admission were shown to be 29\% in 3 hours and 75\% within 6 hours in a French stroke unit basically due to Emergency Medical Services and Fire Department ambulances.\textsuperscript{12} In Beijing China, median time from onset to ED was 5.17 hours and time for CT was 10 minutes with 78.2\% of patients treated within one hour.\textsuperscript{13} At a center in New Delhi India 25\% of patients were admitted within 3 hours of symptom onset, a result comparable to our population but they had significant higher percentage at 6 hours (49\%).\textsuperscript{14}

Although the present study did not address the factors causing the time delay, lack of awareness, low threat perception, non-availability of ambulance services and contact with local general practitioner have been attributed for this delay in previous studies.\textsuperscript{15,16}

In conclusion, only 17\% stroke patient arrived at hospital within three hours of onset of symptoms. Efforts should be made to reduce the delays at all levels. With poor socio-
economic structure, low level of education and awareness, lack of health services and rising incidence of risk factors for stroke, the need seems to be all the more important.

REFERENCES


