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Research Article

Safety of Thrombolytic therapy at emergency department vs coronary care unit: A comparative study of 100 patients at tertiary Cardiac care centre

Abstract

Objective: To determine the safety of thrombolysis (streptokinase administration) at Emergency department with comparison to coronary care unit of AFIC& NIHD, Pakistan.

Study Design: Comparative cross-sectional study.

Place and Duration of Study: Emergency department and coronary care unit of Armed Forces Institute of Cardiology & National Institute of Heart Diseases Rawalpindi, Pakistan from December 2016 till May 2017.

Material and Methods: All the patients with a confirmed diagnosis of acute myocardial infarction who were indicated for thrombolysis in emergency department (ER) and coronary care unit (CCU) during our study time period were included in the study through consecutive sampling. Demographic and clinical data of all patients were collected. Data was entered and analyzed in SPSS-23.

Results: A total number of 100 patients were recruited in our study. The mean age of the patients was 58.18±15 years with minimum age 22 years and maximum age 85 years. Males were more in number 85 (85.0%). 64 (64.0%) patients were given streptokinase at emergency department while 36 (36.0%) were thrombolysed in coronary care unit. The most common indication for thrombolysis at ER was anterior wall myocardial infarction 24 (24.0%). The most common risk factor was smoking history (47%) followed by family history (36%). Door to needle time was smaller in emergency department in comparison with CCU [18.8±1.4 min vs 23.5±2.0 min (p=0.04)]. Major adverse cardiac events during streptokinase administration were transient hypotension, arrhythmias, hemorrhage and mortality which were minimal in Emergency Department as compared to Coronary Care Unit. Patients were immediately treated for the events accordingly both in emergency department and coronary care unit.

Conclusion: Our study results yielded that thrombolysis with streptokinase was safe and effective at emergency department when compared with coronary care unit. Reducing door to needle time by considering thrombolysis at emergency department can improve the outcomes of patients.

Introduction

Introduction and application of fibrinolytic therapy into medical environment which reduces mortality and morbidity has been revolutionized in the management of the active ST segment elevation of myocardial infection (STEMI). The application of thrombolytic agents may limit the size of the infarct, maintain the left ventricular function and thus improve survival of patients [1]. Despite the significant benefits and vitals of this regimen, certain potential barriers have been identified especially in developing countries which limit this therapeutic procedure, for example pre-hospital delayed, financial constraints and a lack of infrastructure. In low-income countries, fibrinolytic therapy may be used for easier availability of some cheaper thrombolytic agents and a good infrastructure [2].

Delaying thrombolysis may dramatically reduce the level of survival and severe disabilities in the patients affected. In addition, delaying therapy through this scheme was shown to associate with higher 6-month mortality in STEMI patients (18%-25%) [3]. Thrombolytic agents are also shown to decrease mortalities overall from 30-35 days. Therefore, it would be very appropriate to consider the timely identification

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and treatment of qualifying patients. A standard time for STEMI thrombolysis planning based on a first call for help or upon arrival to hospital has been recommended for the door-to-needle time (DNT) [4]. Of course, this time can be reduced by reducing the time the patient arrives in hospital by starting thrombolytic treatment. The study was performed on a sample of patients in fibrinolytic therapy following acute myocardial infarction to determine the DNT [5,6].

Material and Methods

In this comparative cross-sectional study conducted at Emergency department and coronary care unit of Armed Forces Institute of Cardiology & National Institute of Heart Diseases Rawalpindi Pakistan, from December 2016 till May 2017; all the patients with a confirmed diagnosis of acute myocardial infarction who were indicated for thrombolysis in emergency department and coronary care unit during our study time period were included through consecutive sampling. Demographic and clinical data of all patients were collected. Permission was taken from Hospital IERB committee. Statistical analysis was conducted using SPSS software version 23.

Results

A total number of 100 patients were recruited in our study. The mean age of the patients was 58.18±15 years with minimum age 22 years and maximum age 85 years. Males were more in number 85 (85.0%). 64 (64.0%) patients were given streptokinase at emergency department while 36 (36.0%) were thrombolysed in coronary care unit. The most common indication for thrombolysis at ER was anterior wall myocardial infarction 24 (24.0%). The most common risk factor was smoking history (47%) followed by family history (36%) as shown in table 1. Door to needle time was smaller in emergency department in comparison with CCU [18.8±1.4 min vs 23.5±2.0 min (p=0.04)]. Major adverse cardiac events during streptokinase administration were transient hypotension, arrhythmias, hemorrhage and mortality which were minimal in number in Emergency Department as compared to Coronary Care Unit as shown in table 2. Patients were immediately treated for the events accordingly both in emergency department and coronary care unit. Reasons for SK administration and contraindications for PPCI are shown in figure 1.

Discussion

About 6 –7 million people in the USA are admitted to the hospital emergency departments each year, suspected of having coronary artery disease. About 20%-25% of these patients are diagnosed with coronary artery diseases and are expected to be treated as necessary [7]. The most common reason for the use of hospitalizations in developed countries is acute myocardial infarction. Every year there are 650,000 acute myocardial infacrtion patients in the US and more than 450,000 people in recurrence of the disease [8]. The administration of a thrombolytic agent for decreasing mortality in acute myocardial infaction patients is one of the most effective treatments for this disease. Thrombolytic therapy administration may be advantageous within a few years of the onset of clinical acute myocardial infarction symptoms. The therapy aims primarily at reducing the infarct zone after the reduced reperfusion time [9].

In the first hours after acute myocardial infarction development, the mortality rate in patients treated decreased between 50% and 40% in clinical studies. This is linked to an increased risk of death in patients with delays in thrombolytic therapy [9]. Two categories generally delay in initiating therapy: a) delay in the time of admission to hospital that can happen for a number of reasons, for instance. The provision of cardiac pain for non-cardiac reasons and living alone and b) delays in the hospital are long distance between the residence of the

Table 1: Showing comparison between two groups regarding demographical & clinical variables.

Variables	SK in Emergency Department (n =64)	SK in Coronary Care Unit (n= 36)	*p* Value
Gender • Male • Female	 56(56.0%) 8(8.0%)	 29(29.0%) 7(7.0%)	0.25
Smoking History	33(33.0%)	14(14.0%)	0.15
Family History	26(26.0%)	10(10.0%)	0.01
Diabetes	5(5.0%)	6(6.0%)	0.55
Hypertension	16(16.0%)	4(4.0%)	0.12
COPD	1(1.0%)	-	-
Door to needle time(mean±S.D)	18.8±1.4 Minutes	23.5±2.0 minutes	0.04
Events During SK • Transient Hypotension • Raised CPK Levels • Resolution of ECG Changes • Uneventful	 8(8.0%) 15(15.0%) 57(57.0%) 48(48.0%)	 10(10.0%) 13(13.0%) 32(32.0%) 23(23.0%)	0.03
Interventions • Normal Saline • Noradrenaline • Dobutamine • Isoket • DCCV • No intervention	 21(21.0%) 8(8.0%) 1(1.0%) 2(2.0%) 3(3.0%) 29(29.0%)	 9(9.0%) 2(2.0%) 3(3.0%) 0(0%) 2(2.0%) 20(20.0%)	0.04

Table 2: Showing Major Adverse Cardiac Events (MACE) in both groups.

Major Adverse Cardiac Events	SK in Emergency Department (n =64)	SK in Coronary Care Unit (n= 36)	*p* Value
Mortality	-	1(1.0%)	-
Arrhythmias	2(2.0%)	3(3.0%)	0.45
Hemorrhage	-	1(1.0%)	-

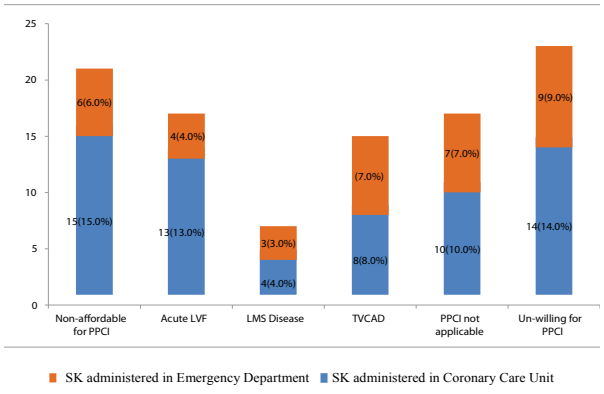

Figure 1: Showing Reasons for SK Administration& Contraindications for PPCI.

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patient and the hospital [10]. It is a highly significant interval of time between patient admission to emergency department and the start of AMI therapy; this is generally referred to as door-to-needle (DTN) time; actually, DTN time should not be longer than 30 minutes. Many institutions have put in place strict strategies to reduce fibrinolytic administration time for door to needle time. A diligent team following clear protocols has been demonstrated to efficiently reduce the time of the door to needle time in one hospital [9].

Our study estimated that the average time for door to needle time was 20.39 minutes, door to needle time was smaller in emergency department in comparison with CCU [18.8±1.4 min vs 23.5±2.0 min (p=0.04)]. This was around 54 minutes in a study conducted in Israel [5]. The mean time of DTN was also estimated to be about 43 minutes in a study carried out in Vancouver, Canada [11]. Door to needle time was reported to be 60 minutes in patients administered streptokinase at the Singapore National University hospital [7], also, this time, a Glasgow study was reported to be 64 minutes [12]. DTN time however in a Kelly et al., cohort study. About 46.5 minutes have been used. O'Rourke et al., in this respect. The ECG equipment in emergency department could substantially reduce the time available for the DTN. Such equipment has now proved to be readily accessible and efficient in many centers [11]. The comparison of the study with previous research shows that the time of door to needle in this study is noticeable. In addition, the results of several studies [10-13], show that intravenous thrombolytic therapy in emergencies rather than CCUs is one of the main strategies for reducing DTN times; fortunately this strategy has been put into place at our center. We found the association between the emergency department crowding and increased patient with door to needle time, which was somewhat aligned with the results of a study conducted in Toronto, Canada [5].

As far as efficacy and safety of streptokinase at Emergency department was concerned. Events during SK administration and major adverse cardiac events (MACE) were less in emergency department vs coronary care unit as shown in tables 1,2.

In our analysis, we have noted that the high workload of emergency department personnel is associated with the increased period of door to needle time (DTN), which is a barrier for patients with suspected AMI to cardiac treatment at emergency department. Considering the information provided by the current study and the importance of a reduction of DTN time to reduce acute myocardial infarction deaths, the following recommendations appear practical: a) streptokinesis administration in emergency department instead of CCU; b) accelerating the admission process of acute myocardial infarction-suspected patients; c) sufficient training and awareness of emergency staff to better understand the importance of time in treatment [14-17].

Conclusion

Our study yielded that thrombolysis with streptokinase was safe and effective at emergency department when compared with coronary care unit. Reducing door to needle time by considering thrombolysis at emergency department can improve the outcomes of patients.

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