Dysrhythmias Induced by Streptokinase Infusion in Patients with Acute Myocardial Infarction Admitted to Cardiac Care Units in the Northwest of Iran

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Abstract
Objective: Currently, the most common cause of death in the world is cardiovascular disease, particularly myocardial infarction. Myocardial infarction is caused by reducing or cutting off the blood supply to the heart muscle due to obstruction caused by the presence of plaque or thrombus. The first step for the treatment of acute myocardial infarction is using thrombolytic drugs. By the analysis of plaque and removing the blockage, the blood flows to the affected area again. The most important thrombolytic agent is streptokinase; however, in addition to its therapeutic effect it also has some complications and by identifying them mortality and disability can be prevented. The present study aimed to investigate the most common arrhythmia after infusion of streptokinase in patients with acute myocardial infarction (AMI).

Materials and Methods: This research was a descriptive study. The study population included patients admitted to the cardiac care unit of Shahid Madani Hospital, Tabriz, Iran, with a diagnosis of AMI from September 2012 until March 2014. Data were collected by using a checklist and the findings of the study were analyzed by SPSS software.

Results: Of the 116 hospitalized patients, 78 (67.5%) were male and 37 (32.5%) were female, and the largest percentage of infected patients was in the age group of 60-70 years [n = 38 (33%)]. Regarding cardiac risk factors, 57 (49%) of patients were hyperlipidemic, 36 (31%) were diabetic, 34 (30%) had high blood pressure, 25 (21%) were smokers, and 21 (18%) had a positive family history of cardiac problems. Patients who were admitted with a diagnosis of AMI, in 53 (46%) cases had streptokinase injection, and in 86 (74%) complications had occurred during drug injection; 87 (75%) patients had dysrhythmia and 29 (25%) had bleeding. Common dysrhythmia was premature ventricular contraction (PVC) with 90 (78.2%) cases. Moreover, 53 (46%) patients had slow ventricular tachycardia (VT), 18 (16%) had premature atrial contraction (PAC), and 5 (4%) had other arrhythmias. Mean of creatine phosphokinase (CPK) was 604, lactic dehydrogenase (LDH) 565.4, creatine phosphokinase mb (CKmb) 58.2, and cardiac troponin I (CTNI) 8.7.

Conclusion: By the timely referral of patients and knowledge of the nurses about complications of streptokinase, its side effects can be prevented.

Keywords: Acute Myocardial Infarction, Dysrhythmia, Streptokinase, Thrombolytic Therapy

Introduction
Acute myocardial infarction (AMI) is one of the most common causes of hospitalization in the world. Approximately 1.1 million people in America suffer from this disease every year. AMI mortality rate is approximately 30% and more than half of these deaths occur before arrival to the hospital. Over the past two decades, the mortality rate of AMI after being hospitalized has fallen more than 30%, despite this, almost 1 out of every 25 hospitalized patients who survive the first admission die every year. The survival rate of the elderly (more than 75 years of age) is significantly lower than the general population.
age) has significantly declined. Mortality rates, one month and one year after AMI were 20% and 30%, respectively (1).

The rate of coronary heart disease (CHD) is growing every day and it is the leading cause of death and disability in developed countries (2). According to the Ministry of Health and Medical Education of Iran, 300,000 deaths annually are due to heart disease and about 4 million people live with its complications (3). With appropriate and timely treatment, the morbidity, mortality, admissions, and days of hospitalization of the patients can be decreased.

CHDs include: unstable angina (UA), ST-elevation myocardial infarction (STEMI), and non-ST elevation MI (NSTEMI) (4,5). Economic costs associated with ischemic heart diseases are high; about 60 billion dollars per year in the United States which includes prevention, treatment, and rehabilitation (6). The major arterial vessel is involved in this illness; by the blockage of this artery, CHD is developed. Myocardial infarction is a process in which some parts of the myocardial muscle are destroyed due to reduced coronary blood flow. Restoration of blood in these veins is a significant progress in treating this disease.

Immediate reperfusion (opening of blocked blood vessels) of ischemic myocardium could preserve it before leaving irreversible damages (7). The first step in the treatment of MI is using thrombolytic agents. The most important of these drugs is streptokinase (8). Appropriate thrombolytic therapy reduces infarct area, preserves left ventricular function, and reduces the rate of serious complications such as perforation of the valve, cardiogenic shock, and ventricular arrhythmias (9).

Myocardial infarction prognosis is mainly related to the two groups of side effects of:
1. Electrical complications
2. Mechanical complications

The majority of deaths caused by fibrillation occur within 24 hours after the onset of symptoms half of which occur in the first hour (10).

Thrombolytic therapy reduces mortality rate, length of hospitalization, and subsequent costs, and it is mostly performed when rapid access to percutaneous coronary intervention is not possible, but it is a bridge to future procedures for revascularization (Coronary Artery Bypass Graft, Percutaneous Coronary Intervention) (11).

Due to the importance of thrombolytic therapy in patients with AMI and the need to have knowledge of its complications and since reviewing information resources showed that few consistent studies have been conducted on this matter, this study was performed. The overall objective of this study was to determine the dysrhythmia which occurs during and after streptokinase infusion in patients with AMI, and to improve nurses' knowledge on indications and complications of streptokinase.

Complications of thrombolytic therapy

Hemorrhage: It was found that 70% of cases of hemorrhage occur in the blood vessels (12). Cerebral hemorrhage is the most serious complication of thrombolytic therapy (13). Reperfusion injury, cell death, vascular injury, myocardial dysfunction due to intracellular biochemical changes, and dysrhythmia due to electrical instability can cause premature ventricular contraction (PVC), ventricular tachycardia (VT), and ventricular fibrillation (VF).

The incidence of VF after thrombolytic therapy is about 4.1% and VT 3.5%, and a combination of both about 2.7% (13). In-hospital mortality induced by VT was 18.6% and by VF was 44% (14). Systematic review of studies on thrombolytic therapy requires further investigation to identify its final using time, its use in average strokes, and environments in which it is more effective for routine thrombolysis operations (15).

Materials and Methods

This was a descriptive study conducted from September 2012 until March 2014 on 116 patients hospitalized in Shahid Madani Hospital, Tabriz, Iran, with AMI diagnosis. Data was collected using a questionnaire and by interviewing the patients and the information was gathered in the patients’ files. Cardiac markers, including cardiac enzymes and Toroponin I, were measured by kit PARS Azmon and kit CTNi Monobind. This registry was designed to be compatible with current acute coronary syndrome (ACS) guidelines; UA is defined as angina pectoris (or equivalent type of ischemic discomfort) with at least one of the three following features:

- Being a new onset and severe
- Occurring at rest or with minimal exertion
- Occurring with a crescendo pattern

In the presence of at least two of the following, the diagnosis of MI was made:

- Characteristic symptoms
- Electrocardiographic changes
- Typical rise and fall in biochemical markers including cardiac troponins and CK-MB.

All statistical analyses were performed with SPSS for Windows (version 18, SPSS Inc., Chicago, IL, USA).

Results

From a total of 287 patients, in 171 (59.5%) cases the diagnosis was UA, and data of the remainder of the cases (116 cases) was analyzed. The results showed that 78 (67.5%) patients were male and 37 (32.5%) were female, and 112 (96%) patients were married and 5 (4%) were single. Furthermore, 57 (49%) had hyperlipidemia, 36 (34%) had diabetes, 34 (30%) had hypertension, 5 (21%) were smokers, and 21 (18%) had a positive family history of heart disease (Table 1). The findings also showed that 88 (68%) patients had a history of hospitalization due to other causes, 91 (79%) patients had a history of heart disease, and 34 (30%) were admitted to the CGU for the first time. In addition, 110 (95%) patients were immediately visited after hospitalization, and 6 (5%) were visited one hour...
Table 1. Baseline personal characteristics and risk factors of patients presenting with acute myocardial infarction

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency</th>
<th>Percentage (%)</th>
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<tbody>
<tr>
<td>Education</td>
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<tr>
<td>Illiterate</td>
<td>60</td>
<td>52</td>
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<tr>
<td>Pre-university education</td>
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<tr>
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<td>16</td>
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<tr>
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<td>8</td>
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<tr>
<td>Risk factors</td>
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<td></td>
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<tr>
<td>Hyperlipidemia</td>
<td>57</td>
<td>49</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>36</td>
<td>31</td>
</tr>
<tr>
<td>Hypertension</td>
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<td>30</td>
</tr>
<tr>
<td>Smoking</td>
<td>25</td>
<td>21</td>
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<tr>
<td>Positive family history</td>
<td>21</td>
<td>18</td>
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after admission. The age group of 60-70 years had the highest percentage of MI with 38 (33%) (Figure 1). Moreover, 51 (44%) patients were hospitalized during the night shift, 34 (29%) in the morning, and 29 (25%) during the evening shift.

Among the patients, 53 (46%) were hospitalized for 1-3 days, 33 (28.4%) for 4 days, 18 (16%) for 5 days, 9 (8.4%) for 6 days, and 2 (2%) were hospitalized for 7 days. In addition, 110 (95%) patients had the same final diagnosis as their first diagnosis, and only in 6 (5%) cases the diagnosis had changed. In 171 (59.5%) of all cases, patients were diagnosed with UA, 16 (14%) NSTEMI, 31 (27%) STEMI (Figure 2).

Among patients with STEMI, anterior MI was the most common type (n = 33; 32.8%), followed by inferior (n = 25; 22.4%), anterior lateral MI (n = 18; 16.8%), extensive anterior lateral MI (n = 17; 15.8%), inferior anterior MI (n = 7; 6.6%), and posterior MI (n = 6; 5.6%), respectively (Figure3). In 53 (46%) patients, who were admitted with a diagnosis of AMI, streptokinase therapy was administered and in 86 (74%) patients complications had occurred during drug infusion. Dysrhythmia was observed in 98 (85%) patients and in 29 (25%) bleeding occurred. In all patients who received streptokinase the most common dysrhythmia was PVC with 90 (78.2%). In 53 (46%) patients slow VT, in 18 (16%) PAC, and in 5 (4%) other arrhythmias were observed (Figure 4). Mean of creatine phosphokinase (CPK) was 604, lactic dehydrogenase (LDH) 565.4, creatine phosphokinase mb (CKmb) 58.2, and cardiac troponin I (CTNI) 8.7 (Figure 5).
patients with AMI, mechanical and electrical cardiac complications can be prevented and morbidity and mortality rates, length of hospitalization, and the cost of treatment can be reduced through the prompt referral of the patients, and nurses’ awareness of streptokinase infusion complications.

Ethical issues
Written informed consent was obtained from the patients for publication of this study. In addition, the study has been approved by the local ethics committee.

Conflict of interests
We declare that we have no conflict of interests.

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References


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