

Anti-streptokinase Antibody Detection before and Immediately after Streptokinase Therapy in Patients with Myocardial Infarction

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ABSTRACT

Background: Myocardial infarction (MI) is one of the most common and serious diseases resulting from coronary artery occlusion and major reduction in blood flow. Streptokinase as a thrombolytic is considered the first and most important therapeutic intervention for reperfusion following MI in most countries including Iran. Our previous study showed that, the prevalence of high antibody titers against streptokinase was 13.5% in the studied population from Iran, which was 2.5 times more common than data from other studies. **Objective:** To evaluate anti-streptokinase antibody titers before and immediately after streptokinase administration and its relation to reperfusion therapy success rates. **Methods:** A total of 200 patients with acute MI was selected. Antibodies against streptokinase were measured before and 2 days after administration of streptokinase. Before streptokinase administration and every hour after streptokinase administration, for 3 consecutive hours, an ECG was taken from each participant and changes were evaluated in relation to antibody levels. **Results:** Out of 200 patients, 42 (21%) had high levels of antibody titer. Out of these 42 patients, 13 (6.5%) still had measurable levels of anti-streptokinase antibody after streptokinase administration. **Conclusion:** Our results show the ability of the anti-streptokinase antibody to neutralize the effects of streptokinase.

Keywords: Streptokinase, Anti Streptokinase Antibody, Myocardial Infarction

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INTRODUCTION

Myocardial infarction (MI) is one of the most common and serious diseases resulting from coronary artery occlusion or major reduction in blood flow which occurs due to atherosclerosis (1). In spite of remarkable achievements in the management of MI in recent decades, ischemic cardiac disease is still one of the major health problems in developing countries (2).

Currently 4 reperfusion modalities are used for management of coronary artery occlusion: autolysis, thrombolytic therapy, balloon angioplasty, and coronary artery bypass graft (3).

In Iran and some other developing countries, streptokinase as a thrombolytic is assumed the first and the most important therapeutic intervention for reperfusion, which best matches the socioeconomic status of most patients. However, it should be remembered that streptokinase is prepared from various streptococcal species which cause different streptococcal infections in humans with resultant serotype specific antibody production. As streptococcal infection is common in our country, high levels of antistreptokinase antibody can be anticipated. Therefore there is a possibility of reperfusion failure (4).

Our previous study showed that the prevalence of high antibody titer against streptokinase in the studied population from Iran was 13.5% which was 2.5 times greater than other studies (4).

The objective of this study was to evaluate the titer of the antistreptokinase antibodies before and after streptokinase administration and its relation with reperfusion success rates.

MATERIALS AND METHODS

This study was a cross-sectional study. A total of 200 MI patients admitted to Noor hospital, Isfahan, Iran, was selected by simple sampling.

The case group consisted of patients who were admitted during the first two hours after the onset of chest pain. Patients with Q wave MI, bundle branch block masking the ST segment changes, and patients in whom streptokinase was contraindicated were excluded (5). Participants who died in the first few hours after streptokinase administration were also excluded.

At the time of admission a blood sample and an ECG was obtained from each participant. ECG was repeated every hour for 3 consecutive hours after administration of streptokinase. ST segment elevation suggestive of MI had to be confirmed in patients' ECG. Antistreptokinase antibody level was also recorded 2 days after administration of streptokinase.

Cardiac enzymes, CPK and CPK-MB, had to be elevated except in patients with successful reperfusion (6).

An ELISA kit was used for detection of antistreptokinase antibody levels. Clinical vial of streptokinase was used as antigen source (SK KABI Pharmacia, Sweden) and patients' sera as source of antibody, then substrate (peroxidase enzyme) was added (4). Optical density was determined at 492 nm using BIO-TEK instrument ELISA reader.

Resolution of ST segment as much as 50-70% during 1.5 to 2 hours after streptokinase administration was an indication of successful reperfusion, based on TIMI flow scale (TIMI 3) (7-9).

RESULTS

Forty two (21%) of 200 patients had elevated anti-streptokinase antibody before administration of streptokinase, 13 cases (31% and 6.5% of all cases) still had measurable anti-streptokinase antibody levels after administration of streptokinase. In the remaining patients (158 cases), none had a measurable anti-streptokinase antibody level 2 days after administration of streptokinase.

Out of 200 patients, 155 (77.5%) developed Q wave during hospitalization period (Table1) and 28 patients had 50% to 70% ST segment resolution during 1.5 to 2 hours after streptokinase administration of whom 26 had low antibody titers (Table2). 12 patients (6%) died in hospital, of whom 4 had high antibody titers. This was 9.52% of the patients who had high antibody titer (42 patients).

Table 1. Relation between Q-wave formation and anti-streptokinase antibody titer before administration of Streptokinase (P=0.064)

Q-Wave Formation	Prevalence	High titer	Low titer
Positive	155	37 (23.87%)	118 (76.12%)
Negative	45	5 (11.11%)	40 (88.88%)
Total	200	42 (21%)	158 (79%)

Table 2. Relation between resolution of ST segment and antistreptokinase antibody titer before administration of Streptokinase (P=0.048)

ST segment resolution	Prevalence	High titer	Low titer
Positive	28	2 (7.14%)	26 (92.85%)
Negative	172	40 (23.25%)	132 (76.74%)
Total	200	42 (21%)	158 (79%)

DISCUSSION

Although spontaneous reperfusion can occur after MI, persistent thrombotic occlusion of coronary arteries is present in most cases, so widespread use of thrombolytic therapy including streptokinase should be considered. It is postulated that the strategy of primary angioplasty was no better than the strategy of fibrinolysis with provisional rescue angioplasty in patients presenting with MI (10). Considering all the facts still some problems with SK therapy such as resistance should be resolved.

Some studies suggest that in the presence of high anti-streptokinase antibody levels following streptococcal pharyngitis, a time period of 3 to 6 months should pass before streptokinase can be administered (11). Buchalter et al. reported development of streptokinase resistance, from 2 days to 2 years or even after 4 years of SK administration (12). Readministration of streptokinase in patients who received it in the past 4 to 6 months has a relative contraindication.

Fears et al. found no clinical resistance to streptokinase despite presences of antistreptokinase antibody (13).

Our previous study showed that prevalence of antistreptokinase antibody is 2.5 times more common in our population than western populations; however there was no significant association between antibody levels and Q wave formation (4).

In the current study, we doubled the sample size and measured antibody levels after streptokinase administration. We found a significant relationship between resolution of ST segment elevation, degree of reperfusion and antibody levels. However we found no association between Q wave formation and presence of anti-streptokinase antibody, similar to Schroder et al. and Krucoff et al. studies (14, 15).

Variations in the prevalence of antibody titer against streptokinase are due to differences in the prevalence of streptococcal infections in different regions. The season in which the study is carried out, is also an important factor, as the prevalence of the streptococcal infections is higher in autumn and winter. As streptokinase is imported to our country, the expiration date and the volume of its effective material should also be checked (16).

In conclusion, in a population with elevated anti-streptokinase antibody levels, there is a chance for neutralization of streptokinase used as a fibrinolytic drug.

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