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ORIGINAL ARTICLE

Impact of upstream high bolus dose tirofiban on left ventricular systolic function in patients with acute anterior myocardial infarction treated by primary coronary intervention

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KEYWORDS

High bolus tirofiban;
Primary PCI

Abstract *Background:* Glycoprotein IIb/IIIa inhibitor therapy during primary percutaneous coronary intervention (PCI) decreases the incidence of major adverse cardiac events.
Aim: To study the impact of high bolus dose tirofiban on left ventricular ejection fraction in patients with acute anterior ST segment elevation MI treated with primary PCI.
Patients and methods: Forty patients presenting to Ain Shams University, and specialized hospitals with the diagnosis of acute anterior STEMI were treated with primary PCI. Twenty patients were given conventional intravenous bolus dose tirofiban (10 μg/kg) upstream prior to primary angioplasty and twenty patients were given intravenous high bolus dose tirofiban (25 μg/kg) upstream prior to PCI. In-hospital follow up was done including echocardiography, and serial cardiac enzymes in addition to clinical follow up for MACE and bleeding complications.
Results: Successful primary angioplasty was attained in all patients. The LV systolic function was significantly better in the high bolus dose group in comparison to the conventional bolus dose groups (48% vs 41%, $P < 0.01$). The incidence of recurrent ischemia was statistically non-significant between the two groups (5% vs 25%, $P > 0.05$). Both regimens were safe and the bleeding complications were minimal and did not differ between the study groups.
Conclusion: In patients presenting with acute anterior STEMI and treated with primary PCI, the high bolus dose tirofiban given intravenously upstream prior to PCI seems to be a safe and effective regimen to achieve a better left ventricular ejection fraction in comparison to the conventional bolus dose regimen, without increasing the risk of bleeding.

1. Introduction

Acute myocardial infarction (AMI) remains a public health problem of epidemic proportions. Recent data from the American Heart Association (AHA) reveal a prevalence of

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myocardial infarction (MI) of 1.9–5.2%, which varies with age, sex, and ethnicity.[1] Primary percutaneous coronary intervention (PCI) in patients with AMI has been shown to be preferable to thrombolytic therapy in terms of patient survival, higher rates of patency in the infarcted arteries, and lower rates of reinfarction and stroke.[2,3] These benefits of PCI can be further enhanced by administration of platelet glycoprotein IIb/IIIa inhibitors abciximab,[4,5] or eptifibatide.[6,7] Tirofiban[8] stands out as a potentially useful adjunct to PCI because it is a small non-peptide molecule, somewhat similar to eptifibatide, and does not elicit an adverse immune reaction. Compared with abciximab, its advantages as an adjunct therapy for PCI are lower cost and no overt bleeding complications.[9] Results from studies of the efficacy of adjunctive tirofiban in patients undergoing PCI have been inconsistent.[10–12] Some have shown beneficial angiographic and clinical outcomes,[13,11] whereas others show either no benefit[14] or modest initial clinical improvements, unsustained at 30-day follow-up.[15] Interpretation of these results is difficult because different dosing regimens were used; for example, tirofiban was administered at a conventional dose (10 μg/kg bolus followed by 0.15 μg/kg/min for 18–36 h) in some studies[10,12] and in others[16,17] at a high dose (20–25 μg/kg bolus followed 0.15 μg/kg/min for 18–24 h). The conventional dose of tirofiban may not achieve adequate platelet aggregation inhibition compared with abciximab.[18,19] So, this study was done to clarify the effect of high bolus dose tirofiban on left ventricular ejection fraction in patients with acute anterior myocardial infarction treated with primary coronary intervention in comparison to the standard bolus dose.

1.1. Aim of study

To study the impact of high bolus dose tirofiban given upstream in ER on left ventricular ejection fraction (early in-hospital) in patients with acute anterior ST segment elevation MI treated with primary percutaneous coronary intervention.

2. Methods

2.1. Study population

This randomized study was conducted on 40 patients who came to the emergency room complaining of acute chest pain and diagnosed as having acute anterior ST segment elevation myocardial infarction during the year 2010. The method of randomization was the first suitable one (fulfilling the inclusion criteria) was chosen for group I and the second one for group II, the third suitable one for group I, and so on. All patients were treated by primary percutaneous coronary intervention. The following patients were included in this study: males and females with age between 20 and 70 years presenting with acute chest pain and ST elevation indicative of myocardial infarction, as proposed by the Joint Committee of the European Society of Cardiology (ESC) and American College of Cardiology (ACC), a new ST segment elevation in 2 or more contiguous leads of at least 1 mm at the J point in the anterior leads (V1–V6, I, aVL)[20] with a feasibility to perform PCI within 6 h from onset of symptoms. Patients who have one or more of the following were excluded from the study: Contraindications for antiplatelets such as bleeding disorder including gastrointestinal bleeding, hematuria, or known presence of occult blood in the stool prior to randomization, thrombocytopenia (Platelet count < 100.000/cm^3), systolic blood pressure persistently exceeding 200 mmHg and/or diastolic blood pressure exceeding 110 mmHg at time of enrollment, recent (< 6 months) stroke, patients with severe renal failure (on hemodialysis), patients with recent (< 30 days) major surgery, previous CABG, patients with previous MI, patients who presented more than 6 h from onset of symptoms, patients with known cardiomyopathy and patients who refused to be enrolled in the study.

The patients were divided randomly into two groups according to the bolus dose of tirofiban:

Group (I): It included 20 patients who received the conventional single intravenous bolus dose of tirofiban upstream in the emergency room prior to primary PCI (10 μg/kg over 3 min).

Group (II): It included 20 patients who received a high intravenous bolus dose of tirofiban upstream in the emergency room prior to primary PCI (25 μg/kg).

2.2. Procedures

All patients were subjected to thorough history taking for the presence of cardiovascular risk factors such as smoking, hypertension, diabetes mellitus, dyslipidemia and family history of ischemic heart disease. The patients underwent clinical assessment on admission to the ER. They were classified into 4 classes according to Killip classification. Class 1: patients with no abnormal clinical findings, class 2: patients with pulmonary congestion, elevated jugular venous pressure or having S3 gallop, class 3: patients with pulmonary edema and class 4: patients with cardiogenic shock. Emergency 12 lead surface ECG was done and analyzed for ST segment elevation of > 1 mV in 2 adjacent ECG anterior leads, ST segment depression in the reciprocal leads, evidence of old MI (pathological Q waves), and conduction defects. Cardiac biomarkers were performed by using total CK and CK-MB fraction on admission and then serially every 8 h for 24 h, then daily till normalization, together with full laboratory. The bolus dose of tirofiban was given randomly to the patients according to the group and all patients continued on tirofiban (0.15 μg/kg/min continuous infusion) for 48 h post procedure, in addition to half dose unfractionated heparin or low molecular weight heparin. By using the modified Seldinger technique, coronary angiography was done by using femoral artery puncture, and Target Vessel Revascularization (LAD) was performed by using balloon dilatation ± stenting. Informed consent was obtained before the intervention. Qualified patients received aspirin (300 mg) and clopidogrel (600 mg) before the PTCA procedure. Operators were provided with guidelines for heparin administration during PTCA that recommended a maximum heparin bolus of 10 000 U before the procedure. In the stented patients, clopidogrel 75 mg daily for at least 4 weeks was administered. All patients continued to receive aspirin 150 per day. Other medications, including β-blockers, ACE inhibitors, nitrates, statins and morphine were administered according to the patient's condition. Patients were discharged after normalization of cardiac enzymes and achieving clinical stabilization.