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ORIGINAL ARTICLE

The Outcome of Intracoronary Tirofiban Administation at Primary Percutenous Coronary Intervention in ST-Elevation Myocardial Infarction Patients

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ABSTRACT

Background and Aim: Thrombosis within the coronary arteries causes ST-elevation myocardial infarction. STEMI can be vascularized by primary PCI, which is class-I indication and the gold standard. The present study aimed to assess the outcome of pericardial tirofiban administration in patients with ST-level myocardial infarction following primary percutaneous coronary intervention.

Patients and Methods: This cross-sectional study was conducted on 228 ST-elevation myocardial infarction (STEMI) patients in the Bahawalpur Heart Center, Bahawalpur for the duration of Six months from March 2022 to September 2022. Patients of both gender having an age range 25 to 65 years with STEMI were enrolled and categorized into two groups based on Tirofiban administration are as follows: Group-I comprised of Tirofiban group and Group-II control (non-tirofiban group). All the patients underwent primary percutaneous coronary intervention (PCI). Major bleeding, MACE, TIMI Grade flow, hematoma, myocardial blush, minor bleeding, and mortality were different variables measured. SPSS version 28 was used for data analysis.

Results: The overall mean age was 42.82± 10.26 years. Of the total 228 STEMI patients, there were 166 (72.8%) male and 62 (27.2%) were females. The mean age of group-I (n=114) and group-II (n=114) was 41.74 ± 11.62 years and 43.9± 8.9 years. The age-wise distribution of patients were as follows: 74 (32.5%) in 25-35 years, 70 (30.7%) in 36-45 years, 64 (28.1%) in 46-55 years, and 20 (8.8%) in 56-65 years. The prevalence of hypertension, diabetes, and smoker in Tirofiban and non-tirofiban group was 32 (28.1%) vs. 34 (29.8%), 24 (21.1%) vs. 28 (24.6%), and 31 (27.2%) vs. 33 (28.9%) respectively. A p-value of 0.05 indicated that there was an independent difference in TIMI flow grades between the two groups. Based on clinical outcomes, the incidence of partial reperfusion TIMI flow grade, normal myocardial blush grade, major bleeding, MACE, hematoma, minor bleeding, and mortality was found in 72 (31.6%), 146 (64%), 60 (26.3%), 68 (29.8%), 61 (26.8%), 52 (22.8%), and 8 (3.5%) respectively.

Conclusion: The present study found that patients with severe thrombus burden and STEMI who underwent emergency coronary intervention received intracoronary tirofiban treatment that was simple, safe, and effective. A significant difference in TIMI flow and myocardial blush grades was observed when intracoronary Tirofiban was administered to STEMI patients undergoing percutaneous coronary intervention compared with patients who did not receive intracoronary Tirofiban.

Keywords: Intracoronary Tirofiban, Percutaneous coronary intervention, ST-elevation myocardial infarction, Outcomes

INTRODUCTION

The primary percutaneous coronary intervention is the promising reperfusion therapy in treating the ST-elevation myocardial infarction in terms of survival rate and lowering combined clinical endpoints [1, 2]. In the case of STEMI, prior loading doses of clopidogrel have less antiplatelet effect and less effective after 2–4 h. Thrombus and vascular debris are embolizing the microvasculature eventually leads to the plugging of microvessels and myocardial necrosis [3]. Combination therapy intravenous treatment of glycoprotein (GP) IIb/IIIa inhibitors improves thrombus decomposition by disrupting platelet cross-linking [4, 5], and is related with better infarct-related artery (IRA) patency and clinical outcome [6, 7]. Numerous clinical studies and epidemiological research have demonstrated that intracoronary bolus administration of abciximab and eptifibatide resulted in higher local drug concentrations and platelet GP IIb/IIIa receptor occupancy, better microvascular perfusion, smaller enzymatic infarct size, and a lower rate of major adverse cardiac events (MACE) compared to conventional systemic intravenous treatment [8, 9]. Tirofiban appears to be even more appealing due to its different pharmacologic and pharmacokinetic properties [10], as well as persistent and fast reversible platelet inhibition at higher doses [11, 12].

STEMI is caused by the abrupt blockage of an epicardial coronary artery owing to the atherosclerotic plaque rupture, which leads in thrombus development. The most essential first objective in treating STEMI patients is to restore blood flow to ischemic cardiac tissue as quickly as possible. Primary PCI, if accessible, is regarded the gold standard method for revascularization of the infarct-related artery, according to AHA recommendations. To preserve the diseased myocardium and reduce mortality, either timely conducted primary percutaneous coronary intervention (PPCI) or pharmacological treatment consisting of thrombolysis can restore blood flow through an infarct related artery in ST-segment elevation myocardial infarction (STEMI) patients [13]. Primary PCI is superior to medical therapy when performed by trained professionals [14]. Tirofiban is a modest non-peptide chemical that functions as a GPI. It is chosen over the others because it is more widely available, less expensive, and has less adverse effects14. 10mcg/kg of tirofiban cannot achieve optimal platelet plug inhibition. Tirofiban is often administered intravenously or intra-arterial. During intracoronary injection, the medication concentration is greater in the infarct-related artery [15]. The present study aimed to assess the outcome of pericardial tirofiban administration in patients with ST-level myocardial infarction following primary percutaneous coronary intervention.

METHODOLOGY

This cross-sectional study was carried out on 228 ST-elevation myocardial infarction (STEMI) patients in the Cardiac Center, Bahawalpur for the duration of Six months from March 2022 to September 2022. Patients of both genders having an age range 25 to 65 years with STEMI were enrolled and categorized into two groups based on Tirofiban administration are as follows: Group-I comprised of Tirofiban group and Group-II control (non-tirofiban group). All the patients underwent primary percutaneous coronary intervention (PCI). Major bleeding, MACE, TIMI Grade flow, hematoma, myocardial blush, minor bleeding, and mortality were different variables measured. Patients having a history of CVA, renal failure, bleeding or/and current bleeding, INR range > 1.5, transient ischemic attack (TIA), surgery/trauma history and patients on fibrinolytic treatment within 24 hours were excluded. The Tirofiban group had a high dosage of intracoronary tirofiban in a dose of 25mcg/kg and subsequently IV infusion at 0.15mcg/kg/min for 12 hours, whereas the non-tirofiban group did not receive tirofiban at the time of primary PCI. Before the emergency

department treatment, each patient was given 300mg Aspirin, 600mg clopidogrel, and 5000 IU of unfractionated heparin (UFH). At the option of the physician, the patients will continue to get aspirin 300mg daily and clopidogrel 150mg daily for one year. The patients were observed in the hospital for three days and 30 days following PCI for mortality, CVA, and MI requirements for critical revascularization, hematoma, and major or minor bleeding. SPSS version 28 was used for data analysis. Numerical variables were described as mean and standard deviation. Qualitative variables were expressed as frequency and percentages. All the descriptive statistics was done by taking 95% confidence interval and 5% level of significance.

RESULTS

The overall mean age was 42.82± 10.26 years. Of the total 228 STEMI patients, there were 166 (72.8%) male and 62 (27.2%) were females. The mean age of group-I (n=114) and group-II (n=114) was 41.74 ± 11.62 years and 43.9± 8.9 years. The age-wise distribution of patients were as follows: 74 (32.5%) in 25-35 years, 70 (30.7%) in 36-45 years, 64 (28.1%) in 46-55 years, and 20 (8.8%) in 56-65 years. The prevalence of hypertension, diabetes, and smoker in Tirofiban and non-tirofiban group was 32 (28.1%) vs. 34 (29.8%), 24 (21.1%) vs. 28 (24.6%), and 31 (27.2%) vs. 33 (28.9%) respectively. A p-value of 0.05 indicated that there was an independent difference in TIMI flow grades between the two groups. Based on clinical outcomes, the incidence of partial reperfusion TIMI flow grade, normal myocardial blush grade, major bleeding, MACE, hematoma, minor bleeding, and mortality was found in 72 (31.6%), 146 (64%), 60 (26.3%), 68 (29.8%), 61 (26.8%), 52 (22.8%), and 8 (3.5%) respectively. Figure-1 illustrate the gender's distribution. Age-wise distribution is shown in Figure-2.

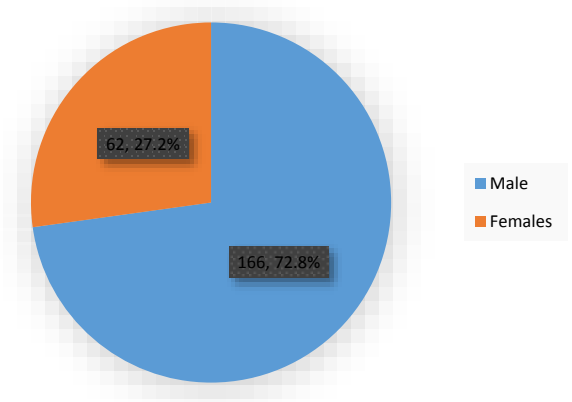

Figure-1: Gender's distribution (n=228)

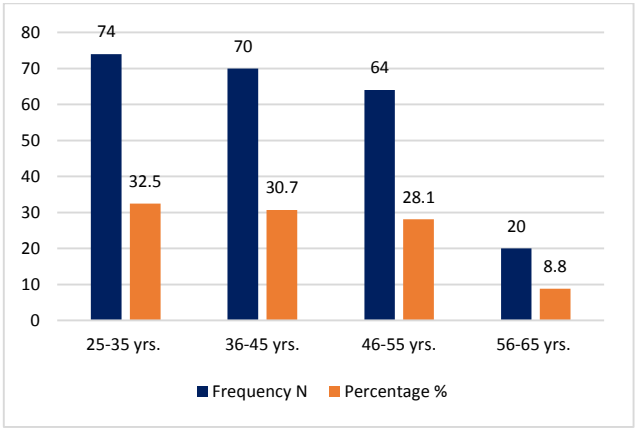

Figure-2: Age-wise distribution of patients (n=228)

The prevalence of hypertension, diabetes, and smoker was compared in Table-I. Clinical outcomes in terms of reperfusion TIMI flow grade, normal myocardial blush grade, major bleeding, MACE, hematoma, minor bleeding, and mortality are shown in Figure-3. Based on MACE, the incidence of MI, CVA, and revascularization is shown in Figure-4. Table-II compared the frequency of MI, CVA, and revascularization in both groups.

Table-1: Prevalence of hypertension, diabetes, and smokers in both groups

Risk factors	Tirofiban group N (%)	Non-tirofiban group N (%)	P-value
Hypertension	32 (28.1)	34 (29.8)	0.854
Diabetes	24 (21.1)	28 (24.6)	0.376
Smokers	31 (27.2)	33 (28.9)	0.745

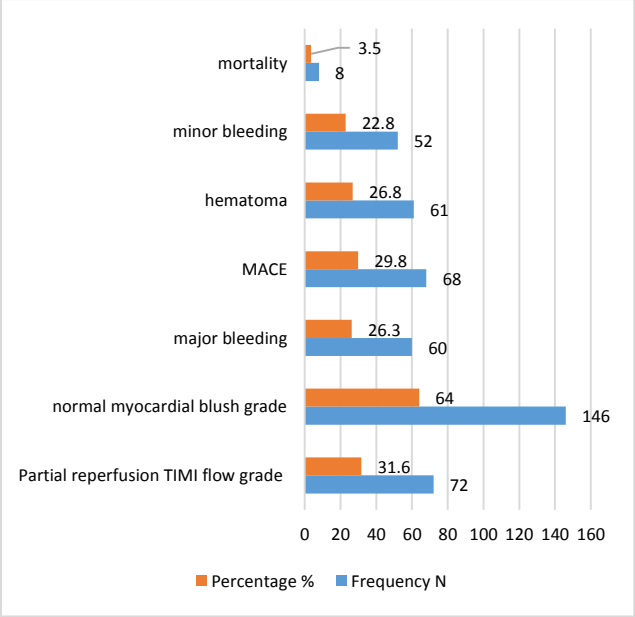

Figure-3: Clinical outcomes

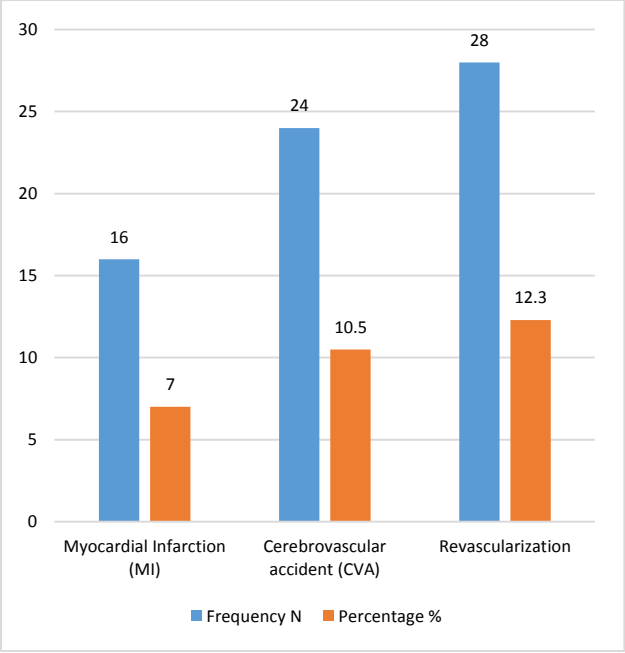

Figure-4: Based on MACE, the incidence of MI, CVA, and revascularization

Table-2: comparison of frequency of MI, CVA, and revascularization in both groups

Parameters	Tirofiban group N (%)	Non-tirofiban group N (%)	P-value
MI	6 (5.3)	10 (8.8)	0.295
CVA	11 (9.6)	13 (11.4)	0.442
Revascularization	12 (10.6)	16 (14.0)	0.412

DISCUSSION

The present study mainly focused on the efficacy of pericardial tirofiban in patients with ST-level myocardial infarction after initial percutaneous coronary intervention and found that patients with significant thrombus load and STEMI who had emergency coronary intervention received easy, safe, and successful intracoronary tirofiban therapy. When STEMI patients receiving percutaneous coronary intervention were given intracoronary Tirofiban, there was a significant difference in TIMI flow and myocardial blush grades compared to patients who did not receive intracoronary Tirofiban. STEMI patients with a high thrombus load, intracoronary tirofiban treatment helped enhance coronary blood flow and myocardial perfusion while also lowering the risk of 30-day MACE. Furthermore, tirofiban increases vascular endothelial function [16]. International studies have shown that early administration of a platelet GP IIb/IIIa receptor antagonist improves the effectiveness of PCI and the prognosis of reperfusion treatment in patients with acute coronary syndrome [17, 18]. Vecchio et al [19] discovered that once myocardium recovers from myocardial ischemia and cell membrane permeability improve, reperfusion, elevated extracellular, and ST-segment elevation resolves rapidly.

PCI may injure vascular endothelial cells, exposing sub endothelial collagen, and increasing platelet adhesion and aggregation. Although intervention therapy opens the epicardial coronary arteries, pieces of atheromatous plaques, necrotic lipids, and inflammatory compounds created during treatment flow to the distal end, activating platelets and causing new thrombosis, including platelet thrombus and fibrin thrombus. Both red and white thrombi are inhibited by tirofiban.

Over the last decade, the best therapy for acute myocardial infarction (MI) has been PPCI to achieve full reperfusion and hence reduce mortality [20]. The benefits of PCI include increased myocardial blood flow and a normal TIMI flow grade, resulting in a lower risk of cardiovascular events [21]. When percutaneous coronary intervention is performed, the vascular complication becomes more prevalent, leading to a rise in the number of fatalities as well as an expensive burden on the patient. These problems also put patients at risk of developing coronary artery disease and death [22]. Even after successful stent insertion, no-reflow events can occur, which the research considers to be the second most serious angiographic-related problem [23].

The study's risk variables, diabetes mellitus, hypertension, and smoking among research participants, were statistically insignificant. Esfandi et al. studied 49 patients, 24 of whom received an intravenous high dosage bolus plus maintenance and 25 of whom received an intracoronary bolus. Gender, age, and other risk factors such as smoking, diabetes mellitus (DM), and high blood pressure were all non-significant in both groups [24], consistent with our findings.

Morteza et al. [25], who evaluated 56 patients and compared high dosage tirofiban via the intracoronary route with 34 patients vs. 22 patients with high dose tirofiban via the intravenous route, preferring these two values of TIMI flow grade 3 and MBG. They discovered TIMI flow grade 3 after PCI in 72.5% of patients against 27.5% of patients, respectively, and MBG 3 in 94% versus 73%. These two factors strongly favor high-dose tirofiban administration via the intracoronary route over the intravenous approach. The findings imply that intracoronary injection of glycoprotein IIb/IIIa inhibitors enables clots to disintegrate promptly because there are higher drug levels in coronaries, prompting glycoprotein receptors to inhibit, preventing platelets from clogging and enhancing circulation [26].

CONCLUSION

The present study found that patients with severe thrombus burden and STEMI who underwent emergency coronary intervention received intracoronary tirofiban treatment that was simple, safe, and effective. A significant difference in TIMI flow and myocardial blush grades was observed when intracoronary Tirofiban was administered to STEMI patients undergoing percutaneous coronary intervention compared with patients who did not receive intracoronary Tirofiban.

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