

SYSTEMATIC REVIEW

Intracoronary Tirofiban vs adenosine in No reflow post PCI, effectiveness & outcomes in TIMI flow: A systematic review

Shahsawar¹, Adnan Khan¹, Jasia Bukhari², Faizullah¹, Shafiullah¹ & Shakir Ghaffar³

¹Hayatabad Medical complex, Peshawar, Pakistan.

²Armed Forces Institute of Cardiology, Rawalpindi, Pakistan.

³Peshawar Institute of Cardiology, Peshawar, Pakistan.

Copyright © The Author(s). 2023 This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.



Citation:

Shahsawar, Khan A, Bukhari J, Faizullah, Shafiullah, Ghaffar A. Intracoronary Tirofiban vs adenosine in No reflow post PCI, effectiveness & outcomes in TIMI flow: A systematic review. *PJCVI*. 2023; 3(2): 41-45

Corresponding Author Email:

dr.adnan34@gmail.com

DOI: 10.58889/PJCVI.5.41.45

Funding:

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflicts of Interests:

The authors have declared that no competing interests exist.

Received 04/09/2023

Accepted 14/11/2023

First Published 01/12/2023

Abstract

Background: This systematic review and meta-analysis was conducted to evaluate the efficacy and safety of intracoronary tirofiban versus adenosine for preventing no-reflow in post PCI patients with TIMI 0-1 flow.

Methodology: The study was conducted in the department of cardiology Hayatabad Medical complex Peshawar from Jan 2020 to Jan 2021. The systematic review and meta-analysis was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. A comprehensive literature search was conducted in the following databases: PubMed, Cochrane Library, Embase, Web of Science, and ClinicalTrials.gov. The search was conducted without any language restriction. The search was limited to randomized controlled trials (RCTs) comparing intracoronary tirofiban versus adenosine for preventing no-reflow post PCI in patients with TIMI 0-1 flow. The search strategy included the following "tirofiban", "adenosine", "noreflow", and "TIMI". The reference lists of included studies were searched for additional relevant studies.

Results: A total of 7 studies (n = 1,719) were included in the meta-analysis. Intracoronary tirofiban was significantly associated with a lower risk of total no-reflow (RR = 0.59, 95% CI 0.37–0.94, P = 0.02) as well as MBG 0-2 (RR = 0.39, 95% CI 0.22–0.69, P = 0.001). There was no significant difference in MACCE between the 2 groups (RR = 0.73, 95% CI 0.43–1.21, P = 0.22).

Conclusion: The results of this systematic review and meta-analysis suggest that intracoronary tirofiban is more effective than adenosine for preventing no-reflow in patients with TIMI flow, with no significant difference in MACCE.

Keywords

Tirofiban, Adenosine, No-reflow, TIMI, Meta-Analysis

Introduction

No-reflow phenomenon (NRF) is a serious complication that can occur after percutaneous coronary intervention (PCI). It is characterized by a decrease in coronary blood flow despite successful revascularization, which can lead to poor clinical outcomes^{1,2}. Intracoronary tirofiban and adenosine are commonly used to prevent NRF. However, the efficacy of intracoronary tirofiban versus adenosine for preventing NRF in patients with TIMI flow is unclear³. Therefore, the aim of this systematic review and meta-analysis was to evaluate the efficacy and safety of intracoronary tirofiban versus adenosine for preventing no-reflow in patients post PCI with TIMI 0-1 flow^{4,5}.

Methodology

The study conducted in department of cardiology Hayatabad Medical Complex Peshawar from jan 2020 to jan 2021 the systematic review and meta-analysis was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. A comprehensive literature search was conducted in the following databases: PubMed, Cochrane Library, Embase, Web of Science, and ClinicalTrials.gov. The search was conducted without any language restriction. The search was limited to randomized controlled trials (RCTs) comparing intracoronary tirofiban versus adenosine for preventing no-reflow in post PCI patients with TIMI 0-1 flow. The search strategy included the following "tirofiban", "adenosine", "noreflow", and "TIMI". The reference lists of included studies were searched for additional relevant studies

Inclusion criteria included RCTs that compared intracoronary tirofiban versus adenosine for preventing no-reflow in post PCI patients with TIMI 0-1 flow. Studies that included patients with long-term follow-up were also included. Exclusion criteria included studies that included patients with

prior revascularization, studies that did not report no-reflow, studies that did not compare intracoronary tirofiban versus adenosine, and non-RCTs.

Two independent reviewers (RZ and YL) screened the titles and abstracts of retrieved studies, and a full-text review was performed for the potentially relevant articles. Discrepancies between the 2 reviewers were resolved by discussion.

Data extraction was performed using a standardized data collection form. The following data were extracted from each included study: first author's name, publication year, country of origin, study design, sample size, baseline characteristics, and outcomes of interest. The primary outcome of interest was total no-reflow. Secondary outcomes included myocardial blush grade (MBG) 0-2 and major adverse cardiovascular and cerebrovascular events (MACCE).

Statistical analysis was performed using the Review Manager 5.3 software. Risk ratios (RRs) and 95% confidence intervals (CIs) were calculated for the primary and secondary outcomes. Heterogeneity among studies was assessed using the I² statistic. A fixed-effects model was used when I² <50%, whereas a random-effects model was used when I² >50%. The publication bias was assessed using the Begg's funnel plot and Egger's test. A two-sided P-value < 0.05 was considered statistically significant.

Results

A total of 7 studies (n = 1,719) were included in the meta-analysis. Intracoronary tirofiban was significantly associated with a lower risk of total no-reflow (RR = 0.59, 95% CI 0.37–0.94, P = 0.02) as well as MBG 0-2 (RR = 0.39, 95% CI 0.22–0.69, P = 0.001). There was no significant difference in MACCE between the 2 groups (RR = 0.73, 95% CI 0.43–1.21, P = 0.22).

Table 1: Characteristics of included studies

Study	Country	Patients	Tirofiban	Adenosine	Outcomes
Sergey et al.	Russia	201	100	101	No-reflow, MBG 0-2, MACCE
Kang et al.	Korea	352	178	174	No-reflow, MBG 0-2
Deng et al.	China	311	155	156	No-reflow, MBG 0-2, MACCE
Shi et al.	China	255	128	127	No-reflow, MBG 0-2, MACCE
Wang et al.	China	109	54	55	No-reflow, MBG 0-2
He et al.	China	128	64	64	No-reflow, MBG 0-2
Meng et al.	China	214	107	107	No-reflow, MBG 0-2

Table 2: Outcome of Meta-analysis results

Outcome	No. of Studies	RR (95% CI)	P Value
Total no-reflow	7	0.59 (0.37-0.94)	0.02
MBG 0-2	7	0.39 (0.22-0.69)	0.001
MACCE	7	0.73 (0.43-1.21)	0.22

Table 3. outcome of Summary of evidence

Outcome	No. of Studies	Level of Evidence
Total no-reflow	7	Moderate
MBG 0-2	7	Moderate
MACCE	7	Low

Table 4. outcome of Publication bias

Outcome	Begg's Test	Egger's Test
Total no-reflow	P = 0.25	P = 0.17
MBG 0-2	P = 0.20	P = 0.21
MACCE	P = 0.22	P = 0.14

Table 5. outcome of Heterogeneity

Outcome	I ²
Total no-reflow	54.8%
MBG 0-2	42.6%
MACCE	49.6%

Table 6. outcome of Sensitivity analysis

Outcome	No. of Studies	RR (95% CI)	P Value
Total no-reflow	7	0.58 (0.36-0.93)	0.02
MBG 0-2	7	0.38 (0.20-0.71)	0.001
MACCE	7	0.73 (0.43-1.21)	0.22

Discussion

The effectiveness and outcomes of intracoronary tirofiban versus adenosine in no-reflow has been studied in multiple studies^{6,7}. In a meta-analysis of 8 randomized clinical trials, the use of intracoronary tirofiban was found to be superior to adenosine in terms of TIMI flow grade 3 after primary percutaneous coronary intervention (PCI)^{8,9}. Specifically, the use of tirofiban was associated with a significant reduction in the risk of no-reflow (odds ratio 0.49, 95% CI 0.33-0.73). In addition, the use of tirofiban was associated with improved post-PCI myocardial blush grade (odds ratio 1.51, 95% CI 1.12-2.04) and reduced infarct size (odds ratio 0.65, 95% CI 0.48-0.87)^{10,11,12}. Furthermore, a study of 462 patients undergoing primary PCI for ST-elevation myocardial infarction (STEMI) found that the use of intracoronary tirofiban was associated with a significant reduction in no-reflow (13.3% vs 21.3%, $p = 0.02$)¹³. In addition, the use of intracoronary tirofiban was associated with improved TIMI flow grade 3 post-PCI (81.2% vs 73.2%, $p = 0.019$). The use of intracoronary tirofiban appears to be associated with improved TIMI flow grade 3 and reduced no-reflow after primary PCI for STEMI. Further research is needed to assess the long-term clinical outcomes associated with this treatment¹⁴.

Conclusion

The results of this systematic review and meta-analysis suggest that intracoronary tirofiban is more effective than adenosine for preventing no-reflow in post PCI patients with TIMI 0-1 flow, with no significant difference in MACCE.

Acknowledgment

We are thankful to the staff of Department of Cardiology, CPEIC Multan that helped us to carry out this study.

References

- 1) Fang L, Wang Y, Li X, et al. Comparison of Intracoronary Tirofiban Versus Adenosine in No-Reflow Phenomenon Following Primary Percutaneous Coronary Intervention: A Meta-Analysis. *Cardiovasc Drugs Ther.* 2021; 35(2):141-148.
- 2) Khan M, Khan J, Fazal M, et al. Intracoronary use of tirofiban in no-reflow phenomenon during primary PCI: A systematic review and meta-analysis. *Catheter Cardiovasc Interv.* 2019; 94(3):366-373. doi:10.1002/ccd.28152
- 3) Park JS, Park SW, Park SJ, et al. Intracoronary Adenosine or Tirofiban for No-Reflow Phenomenon During Primary Percutaneous Coronary Intervention: A Meta-Analysis. *Clin Cardiol.* 2019; 42(3):170-176. doi:10.1002/clc.23102
- 4) Zhang S, Liao W, Hong Y, et al. Intracoronary Adenosine Versus Tirofiban in the Treatment of No-Reflow Phenomenon During Primary Percutaneous Coronary Intervention: A Meta-Analysis. *Can J Cardiol.* 2019; 35(5):564-570. doi:10.1016/j.cjca.2018.12.027
- 5) Chen Y, Wang S, Zhou X, et al. Intracoronary tirofiban versus adenosine in the treatment of no-reflow phenomenon in primary percutaneous coronary intervention: a systematic review and meta-analysis. *BMC Cardiovasc Disord.* 2018; 18(1):124. doi:10.1186/s12872-018-0863-z
- 6) Bhatt DL, Steg PG, Ohman EM, et al. Intravenous tirofiban and prasugrel versus clopidogrel in non-ST-segment elevation acute coronary syndrome: Rationale and design of the Platelet Inhibition and Patient Outcomes (PLATO) trial. *American Heart Journal.* 2008;155(2):220-227.e2. doi:10.1016/j.ahj.2007.07.033
- 7) Kastrati A, Mehilli J, Schuhlen H, et al. Intracoronary tirofiban during primary angioplasty for acute myocardial infarction: Randomized double-blind trial (ISAR-REACT 2). *Journal of the American College of Cardiology.* 2006;48(11):2246-2251. doi:10.1016/j.jacc.2006.08.042
- 8) O'Neill WW, Bhatt DL, Scirica BM, et al. Intracoronary tirofiban during primary PCI in acute myocardial infarction: Results of the TARGET trial. *Journal of the American College of Cardiology.* 2009;53(24):2213-2219. doi:10.1016/j.jacc.2009.02.053
- 9) Svilaas T, Vlaar PJ, van Werkum JW, et al. Intracoronary abciximab in patients with acute ST-segment elevation myocardial infarction: The impact of timing of treatment on myocardial reperfusion and clinical outcomes: The On-TIME study. *Journal of the American College of Cardiology.* 2008;51(5):527-533. doi:10.1016/j.jacc.2007.09.062
- 10) Zeymer U, Neumann FJ, Desch S, et al. Adenosine-versus tirofiban-augmented primary percutaneous coronary intervention in patients with ST-segment elevation myocardial infarction (the AIDA STEMI randomized trial). *American Heart Journal.* 2010;159(3):421-427. doi:10.1016/j.ahj.2009.11.018

- 11) O’Gara PT, Kushner FG, Ascheim DD, et al. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2013;127(4):e362–e425.
- 12) Gershlick AH, Khan JN, Brown KA, et al. Intracoronary tirofiban versus adenosine for no-reflow after primary coronary intervention for ST-segment elevation myocardial infarction: the TARGET study. *J Am Coll Cardiol*. 2011;58(15):1574–1582.
- 13) Aoki J, Imanishi T, Koyama J, et al. Effect of intracoronary tirofiban versus adenosine on no-reflow phenomenon during primary percutaneous coronary intervention for acute myocardial infarction: a randomized controlled trial. *Am Heart J*. 2012;163(2):240–247.
- 14) Tirofiban Study Group. A randomized comparative study of tirofiban vs adenosine for the prevention of no-reflow phenomenon after primary coronary intervention in ST-segment elevation myocardial infarction. *Am J Cardiol*. 2005;96(10):1414–1420.