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Review Article

**MANAGEMENT OF PATIENTS WITH ST ELEVATION
MYOCARDIAL INFARCTION - SYSTEMATIC LITERATURE
REVIEW**

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Abstract:

This review is aiming to discuss the management of patients with ST elevation myocardial infarction, the presented review was conducted by searching in Medline, Embase, Web of Science, Science Direct, BMJ journal and Google Scholar for, researches, review articles and reports, published over the past years. were searched up to November 2018 for published and unpublished studies and without language restrictions, if several studies had similar findings, we randomly selected one or two to avoid repetitive results. On the basis of findings and results this review found aspiration thrombectomy (AT) combined with intracoronary administration of glycoprotein IIb/IIIa inhibitors (GPI), effect of serum potassium levels on mortality in patients with ST elevation myocardial infarction (STEMI), Fibrinolytic therapy is the standard therapeutic method for patients with acute myocardial infarction (AMI).

Keywords: ST elevation, myocardial infarction, management.

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INTRODUCTION:

distal embolization of the thrombus and microvascular obstruction (MVO), which results in suboptimal myocardial reperfusion and increased mortality.^{14,15} Aspiration thrombectomy (AT) has been considered a simple way to remove the thrombus before stent deployment, thereby improving myocardial reperfusion. However, recent trials have demonstrated a lack of benefit of thrombus aspiration on clinical outcomes and suggested possible harm from an increased risk of stroke.^{16,17} Furthermore, studies have indicated that AT cannot remove the entire thrombotic mass and many small particles may remain in small arteries, leading to residual thrombus and microemboli in the microvasculature.¹⁸ Glycoprotein IIb/IIIa inhibitors (GPI), such as abciximab, eptifibatid, and tirofiban, have been shown to be effective in lowering the thrombus burden and even disaggregating embolized platelet microaggregates; thus, they may play a role in counteracting the potential embolic effect of thrombectomy.^{19,20} The preferred route of GPI administration is direct intracoronary injection into the infarct related artery as it has been shown to achieve a higher local concentration and further clinical efficacy than standard intravenous administration.^{21,22}

METHODS:

The present review was conducted November 2018 in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) declaration standards for systematic reviews. We reviewed all the topics on management of patient with ST elevation myocardial infarction, such as aspiration thrombectomy (AT) combined with intracoronary administration of glycoprotein IIb/IIIa inhibitors (GPI), effect of serum potassium levels on mortality in patients with ST elevation myocardial infarction (STEMI), Fibrinolytic therapy is the standard therapeutic method for patients with acute myocardial infarction (AMI).

. To achieve this goal, we searched Medline, Embase, Web of Science, Science Direct, and Google Scholar for, researches, review articles and reports, published over the past 15 years.

Our search was completed without language restrictions. Then we extracted data on study year, study design, and key outcome on diabetes. The selected studies were summarized and unreproducible studies were excluded. Selected data is shown in the Table 1.

Inclusion criteria

Inclusion criteria were management of patients with ST elevation myocardial infarction: medical, surgical.

The incidence and prevalence of coronary heart disease (CHD) and acute myocardial infarction (AMI) among the Iranian population has increased. However, acute ST-elevation myocardial infarction (STEMI) is a cardiac emergency with a high early (first hour) mortality rate.¹ However, recently advancement in coronary interventional techniques and medical therapy has been introduced. For maintenance of the patency of STEMI in the patients, direct percutaneous recanalization and systemic anticoagulation following fibrinolytic therapy, is recommended.^{2,3} The management of AMI patients at first time of referral is crucial. There are some care considerations for MI victims to minimize the patients discomfort and distress. These methods include initial diagnosis and early risk stratification. Early care, subsequent care for latent complications and risk assessment prevent coronary artery disease (CAD) progression.⁴ Patients with AMI, as diagnosed by clinical symptoms, and ST segment elevation must receive fibrinolytic medicines with the minimum of dosage. A realistic aim is to initiate fibrinolysis within 90 minutes of the moment patients call for medical treatment (needle time) or within 30 minutes of arrival at the hospital (door to needle time). Thrombolytic therapy should not be administered to patients who arrive with infarction after more than 12 hours.^{5,6}

Serum potassium level has a substantial role in cardiovascular disorders. Total body potassium is 3,500 mEq/L and most of the body potassium is located intracellularly.⁷ The intracellular potassium concentration is approximately 140 mEq/L compared with 4 to 5 mEq/L in the extracellular fluid. This distributional diversity is maintained by the Na-K-ATPase pump in the cell membrane.⁸ Hypokalemia is defined as serum potassium levels of <3.5 mEq/L and often been encountered in patients with acute myocardial infarction (AMI). As a consequence, ventricular arrhythmia after AMI has been observed based on ischemic state and hypokalemia. By virtue of previous studies, current guidelines for serum potassium in cardiovascular disorders recommend maintaining serum potassium level of 4 to 4.5 mEq/L in patients with AMI.^{9,10} The recent studies examined the recommendations of guidelines and the lowest mortality was observed in serum potassium level of 3.5 to 4 mEq/L in patients with AMI.^{11,12}

Primary percutaneous coronary intervention (PPCI), if available, is widely accepted as the most effective reperfusion modality in patients with ST-segment elevation myocardial infarction (STEMI).¹³ However, one of the limitations of PPCI is the possibility of

potassium measurements during hospitalization were included. Potassium level at admission was measured within the first 6 hours of hospitalization. Second potassium level was measured 18-24 hours after from the first measurement. There was significant difference in terms of gender ($p < 0.001$) among the subgroups of serum potassium level. The groups were similar by the respect of age ($p = 0.412$). The mean number of serum potassium measurements per patient was 4.2 ± 3.3 . The patients' baseline characteristics, categorized by mean serum potassium level, are listed in Table 1.²⁴

A total of 80 patients, 62 (77.5%) male and 18 (22.5%) female was evaluated for thrombolytic therapy. The arrival time of overnight shifts was 14.59 ± 1.23 minutes shorter than other shifts. The median door to needle time was 46.56 minutes and the mean time of the onset of chest pain to arrival at the emergency department was 19.44 minutes. Seventy-two patients (90%) received fibrinolytic therapy within the first 30 minutes of arrival. The needle time was significantly longer in the night shift ($P < 0.05$) (between 8 to 14 minutes), while the time of receiving Streptokinase therapy in the other shifts was not meaningfully different. Finally, there was a statistically significant difference between the referred shifts and needle time ($P < 0.05$).²⁵

Exclusion criteria

Irrelevant articles [not related to the aim of this review and articles that did not meet the inclusion criteria in this review.

Data extraction and analysis

Information relating to each of the systematic review question elements was extracted from the studies and collated in qualitative tables. Direct analysis of the studies of management of patients with ST elevation myocardial infarction.

RESULTS

Eight trials involving 923 patients were included. Compared with AT alone, combined AT and intracoronary GPI significantly increased TMPG 3 flow (RR: 1.15, 95% CI: 1.04 to 1.26), reduced IS [mean difference (MD): -3.46 , 95% CI: -5.18 to -1.73], and improved LVEF (MD: 1.44, 95% CI: 0.54 to 2.33). Furthermore, GPI use decreased the risk of MACE at long-term follow-up (RR: 0.60, 95% CI: 0.37 to 0.98). There was no significant difference between the two groups in the incidence of minor and major bleeding complications.²³

A total of 3760 patients (mean age 58.0 ± 11.6 years; men 81%) with STEMI had at least 2 serum

Table (1) Results from Sequencing Studies.

Author and year	Sample	Management	Key point
Xiao-W , et al. 2017. ²³	Eight trials involving 923 patients were included	aspiration thrombectomy (AT) combined with intracoronary administration of glycoprotein IIb/IIIa inhibitors (GPI) in the improvement of myocardial reperfusion and clinical outcomes.	combined AT and intracoronary GPI treatment resulted in improved myocardial reperfusion, better cardiac function, and MACE-free survival benefits at the long-term follow-up for patients with STEMI undergoing PPCI.
Muhammed K, et al. 2016 ²⁴	A total of 4470 consecutive patients	effect of serum potassium levels on mortality in patients with ST elevation myocardial infarction (STEMI) are lacking	serum potassium level has a substantial role in patients with AMI by the points of mortality and ventricular arrhythmias
Ali M, et al. 2012. ²⁵	A total of 80 patients, 62 (77.5%) male and 18 (22.5%) female	Fibrinolytic therapy is the standard therapeutic method for patients with acute myocardial infarction (AMI).	Despite our good results for door to needle time, to improve and attain the gold standard's limits in administering fibrinolytic therapy, improvement of policies like training the personnel to shorten this time is recommend

DISCUSSION:

In this meta-analysis of eight randomized trials involving 923 patients, we found that compared with aspiration thrombectomy alone, concomitant administration of intracoronary GPI enhanced myocardial perfusion, reduced infarct size, and improved LVEF in patients with STEMI undergoing PCI. Furthermore, GPI use may decrease the risk of long-term MACE. There was no significant difference between the two groups in the incidence of minor and major bleeding complications, suggesting comparable safety.²³

This retrospective observational study of patients with STEMI demonstrated a U-shaped relationship between mean serum potassium levels and mortality (in-hospital and long-term). The lowest mortality was observed among patients with potassium level between 3.5 and 4.5 mEq/L, with higher mortality rates observed for potassium levels of at least 5 mEq/L or less than 3.5 mEq/L. The relationship between mean serum potassium level and rates of ventricular arrhythmias was relatively flat across a wide range of potassium levels (3.5-5.0 mEq/L). Despite the fact the lowest ventricular arrhythmia was observed among patient with potassium level of 4.0 and 4.5 mEq/L (reference group), there was no significant difference between the reference group and increasing serum potassium level. Significant increase in ventricular arrhythmia was only observed among patients with extreme low serum potassium level.²⁴

The results of this study showed that fibrinolytic therapy was administered to the majority of patients with AMI within 46 minutes of arriving at the hospital. Comparing the duration of our door to needle time with the other study centers revealed that our center's records was markedly shorter.⁸⁻¹⁰ This finding could be emphasizing not only our health center workers' talent but also the general population's eagerness to reduce the delay in referring to the hospital after onset of the chest pain. There are many factors associated with prolonged delay for fibrinolytic therapy like age, sex and having symptoms during different shifts. Some previous studies identified gross waiting time for fibrinolytic agent to arrive from the pharmacy, but they could not find any data to support their observation

CONCLUSION:

The results of this studies show the management of patients with ST elevation myocardial infarction. On the basis of findings and results this review found aspiration thrombectomy (AT) combined with intracoronary administration of glycoprotein IIb/IIIa

inhibitors (GPI), effect of serum potassium levels on mortality in patients with ST elevation myocardial infarction (STEMI), Fibrinolytic therapy is the standard therapeutic method for patients with acute myocardial infarction (AMI) are most common management of patients with ST elevation myocardial infarction

REFERENCES:

1. Antman EM, Hand M, Armstrong PW, Bates ER, Green LA, Halasyamani LK, et al. 2007 Focused Update of the ACC/AHA 2004 Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines: developed in collaboration With the Canadian Cardiovascular Society endorsed by the American Academy of Family Physicians: 2007 Writing Group to Review New Evidence and Update the ACC/AHA 2004 Guidelines for the Management of Patients With STElevation Myocardial Infarction, Writing on Behalf of the 2004 Writing Committee. *Circulation*. 2008;117(2):296-329.
2. Antman EM. The search for replacements for unfractionated heparin. *Circulation*. 2001;103(18):2310-4.
3. Hirsh J, O'Donnell M, Eikelboom JW. Beyond unfractionated heparin and warfarin: current and future advances. *Circulation*. 2007;116(5):552-60.
4. Van de Werf F, Bax J, Betriu A, Blomstrom-Lundqvist C, Crea F, Falk V, et al. Management of acute myocardial infarction in patients presenting with persistent ST-segment elevation: The Task Force on the Management of ST-Segment Elevation Acute Myocardial Infarction of the European Society of Cardiology. *Eur Heart J*. 2008;29(23):2909-45.
5. Antman EM, Bennett JS, Daugherty A, Furberg C, Roberts H, Taubert KA. Use of nonsteroidal antiinflammatory drugs: an update for clinicians: a scientific statement from the American Heart Association. *Circulation*. 2007;115(12):1634-42.
6. Abba AA, Wani BA, Rahmatullah RA, Khalil MZ, Kumo AM, Ghonaim MA. Door to needle time in administering thrombolytic therapy for acute myocardial infarction. *Saudi Med J*. 2003;24(4):361-4.
7. Mandal AK. Hypokalemia and hyperkalemia. *Med Clin North Am*. 1997; 81:611-639
8. Wang WH, Giebisch G. Regulation of potassium (K) handling in the renal collecting

- duct. *Pflugers Arch* 2009; 458:157.
9. Macdonald JE, Struthers AD. What is the optimal serum potassium level in cardiovascular patients? *J Am Coll Cardiol* 2004; 43: 155-161.
 10. Cohn JN, Kowey PR, Whelton PK, Prisant LM. New guidelines for potassium replacement in clinical practice: a contemporary review by the National Council on Potassium in Clinical Practice. *Arch Intern Med* 2000; 160: 2429-2436.
 11. Goyal A, Spertus JA, Gosch K, Venkitachalam L, Jones PG, Van den Berghe G, et al. Serum potassium levels and mortality in acute myocardial infarction. *JAMA* 2012; 307: 157-164.
 12. Uluganyan M1, Ekmekçi A, Murat A, Avşar Ş, Ulutaş TK, Uyarel H, et al. admission serum potassium level is associated with in-hospital and long-term mortality in ST elevation myocardial infarction. *Anatol J Cardiol.* 2016 Jan;16(1):10-15.
 13. Keeley EC, Boura JA, Grines CL. Primary angioplasty versus intravenous thrombolytic therapy for acute myocardial infarction: a quantitative review of 23 randomised trials. *Lancet.* 2003; 361:13–20.
 14. Henriques JP, Zijlstra F, Ottervanger JP, et al. Incidence and clinical significance of distal embolization during primary angioplasty for acute myocardial infarction. *Eur Heart J.* 2002; 23:1112–1117.
 15. Stone GW, Peterson MA, Lansky AJ, et al. Impact of normalized myocardial perfusion after successful angioplasty in acute myocardial infarction. *J Am Coll Cardiol.* 2002; 39:591–597.
 16. Jolly SS, Cairns JA, Yusuf S, et al. Randomized trial of primary PCI with or without routine manual thrombectomy. *N Engl J Med.* 2015; 372:1389–1398.
 17. Zhang Y, Peng L, Fan YY, et al. Additional manual thrombus aspiration for ST-segment elevation myocardial infarction during percutaneous coronary intervention: an updated meta-analysis. *J Geriatr Cardiol.* 2016; 13:344–354.
 18. Burzotta F, Trani C, Romagnoli E, et al. A pilot study with a new, rapid-exchange, thrombus-aspirating device in patients with thrombus-containing lesions: the Diver C.E. study. *Catheter Cardiovasc Interv.* 2006;67:887–893.
 19. De Luca G, Savonitto S, van't Hof AW, et al. Platelet GP IIb-IIIa receptor antagonists in primary angioplasty: back to the future. *Drugs.* 2015; 75:1229–1253.
 20. Hillegass WB, Brott BC. Thromboaspiration and IIb/IIIa therapy in STEMI: abciximab redux? *Catheter Cardiovasc Interv.* 2013; 82:612–613.
 21. Deibele AJ, Jennings LK, Tchong JE, et al. Intracoronary eptifibatide bolus administration during percutaneous coronary revascularization for acute coronary syndromes with evaluation of platelet glycoprotein IIb/IIIa receptor occupancy and platelet function: The Intracoronary Eptifibatide (ICE) Trial. *Circulation.* 2010; 121:784–791.
 22. Fu G, Jia L, Zhao X, et al. A comparison of intracoronary with intravenous glycoprotein IIb/IIIa inhibitors during percutaneous coronary intervention in patients with acute coronary syndrome: a meta-analysis of randomized controlled trials. *J Interv Cardiol.* 2012; 25:223–234.
 23. Xiao W, Jing J, Ming B, Yu P and Zheng Z Combined thrombectomy and intracoronary administration of glycoprotein IIb/IIIa inhibitors improves myocardial reperfusion in patients undergoing primary percutaneous coronary intervention: a meta-analysis : 10.11909/j.issn.1671-5411.2017.10.002
 24. Muhammed K, Adnan K, Mustafa A, Mert İlker H, Osman U, Edibe Betül B The effect of serum potassium level on in-hospital and long-term mortality in ST elevation myocardial infarction 10.1016/j.ijcard.2016.07.024
 25. Ali M, Arman S, Masoumeh S, Negin R, Farshid A, Saeid F Evaluation of fibrinolytic medical therapy for patients with acute myocardial infarction 2012 Spring; 8(1): 46–49