Primary Percutaneous Coronary Intervention in the Elderly: Catheterization or Conservative Approach?

Yaşlılarda Primer Perkütan Koroner Girişim: Kateterizasyon veya Konservatif Yaklaşım?

Yaşlılarda Primer Perkütan Koroner Girişim / Primary Percutaneous Coronary Intervention in the Elderly

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Özet

Kardiyovasküler hastalıklar yaşlılar arasında morbidite ve mortalitenin önde gelen nedeni olmaya devam etmektedir ve yaşlı nüfus, tüm dünyada artmaktadır. Spesifik yaş sınırı, bu nüfusu tanımlamak için kullanılmasa da, "yaşlı" genel olarak 75 yaşından daha büyük bireyleri ifade eder. ST-segment yükselmeli miyokard infarktüsü geçiren yaşlı hastalarda, optimal reperfüzyon stratejisi tartışmalıdır, çünkü sınırlı klinik çalışmalar mevcuttur. Bu makale, ST-segment yükselmeli miyokard infarktüsü geçiren yaşlı hastalar arasında primer perkütan koroner müdahelenin sonuçlarını derlemektedir.

Anahtar Kelimeler

Yaşlı; Müdahele; Miyokart enfarktüsü; Primer; Reperfüzyon

Abstract

Cardiovascular disease remains the leading cause of morbidity and mortality among the elderly and the elderly population has been increasing worldwide. Although no specific age cut-off point is used to describe this population, 'the elderly' generally refers to individuals older than 75 years. The optimal reperfusion strategy in elderly patients with ST-segment elevation myocardial infarction remains debated because limited trial data are available. This article reviews the outcomes of the primary percutaneous coronary intervention among the elderly patients with ST-segment elevation myocardial infarction.

Keywords

Elderly; Intervention; Myocardial Infarction; Primary, Reperfusion

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Introduction

Ischemic heart disease is the leading cause of death among patients in all over the world. Moreover, among people who died of ischemic heart disease, 83% were >65 years of age [1]. The most powerful independent predictor for the development and outcomes of acute coronary syndrome (ACS) is age. Physical and cognitive functioning, comorbid diseases, and drug metabolism are also known to vary in older adults and may alter the course of ACS and response to therapies [2, 3]. Age-releated differences are compared across four groups: <65, 65 to 74, 75 to 84, and >85 years, but 'the elderly' generally refers to individuals older than 75 years [4]. Clinical trials often have inadequate sample sizes within the elderly subgroup, and the heterogeneity among community-treated elderly patients is greater than among elderly patients enrolled in these clinical trials. Thus, much less data is known about the optimal strategy among the elderly patients with ST-segment elevation myocardial infarction (STEMI) [5, 6].

Although the guidelines recommend that STEMI patients be treated with reperfusion strategy and patient's age should not influence decisions about cardiac care, older age is the most important factor associated with failure to receive it [3, 5]. The main goal of this review is to examine the primary percutaneous intervention for the treatment of STEMI in the elderly patients.

ST-Segment Elevation Myocardial Infarction in the Elderly

Although the absolute number of patients with STEMI increases with age, STEMI accounts for a smaller proportion of all ACS admissions in older subgroups (<30% ≥75 years of age) [7]. Prehospital delays are also common in older adults and prevent prompt treatment. Atypical symptoms and ECG findings may slow the recognition of an acute cardiac event [8, 9]. In National Registry of Myocardial Infarction (NRMI) registry [10], chest pain at presentation occurred in 89.9% of STEMI patients <65 years of age versus 56.8% of those ≥85 years of age (figure 1). Acute heart failure at presentation occurred in 11.7% of STEMI patients <65 years of age versus 44.6% of those ≥85 years of age. In addition, left bundle-branch block is more common with elderly population, and it accounts for more than a third of ECGs among patients ≥85 years of age [5, 10]. Among STEMI patients in the NRMI registry [10], ST-segment elevation was present on the ECG of 96.3% of patients <65 years of age, but only 69.9% of those ≥85 years of age. Conversely, left bundle-branch block occurred in 5% of those <65 years of age, but 33.8% of those ≥85 years of age (figure 1).

Elderly patients are more likely to have hypertension, prior stroke, acute heart failure, shock, higher systolic blood pressure, and higher heart rate than patients in other age group [5]. Therefore older age is associated with delayed presentation as well as the increased risk of adverse outcomes [5, 6].

Primary Percutaneous Coronary Intervention: Catheterization or Conservative Approach?

The guidelines recommend that STEMI patients without contraindications be treated with reperfusion strategy if they present within 12 hours, despite lack of consensus on reperfusion for acute myocardial infarction in the elderly. Failure to receive reperfusion therapy was associated with presentation delay, older age (≥75 years), female sex, absence of chest pain, and congestive heart failure [5, 11]. Among STEMI patients in the NRMI registry [10], reperfusion strategy was performed 72% of patients <65 years of age, but this proportion significantly declines with age (figure 2).

The best reperfusion strategy for elderly STEMI patients will likely remain undefined; however mortality benefit of fibrinolytic therapy, as compared with no reperfusion, has been demonstrated [5, 6]. Adjusting the dose of adjunctive antithrombin agents with fibrinolytic therapy improves its outcome in especially elderly patients [6, 12]. Intracranial hemorrhage (ICH) and non-hemorrhagic stroke are major complications of fibrinolytic therapy that increase with age and fibrin-spesific agents; however it appears to decrease total mortality in the elderly [6, 13-15].

Elderly patients are more likely to have calcific, tortuous vessels and complex, multivessel disease. In addition multiple physiological changes occur with age and all of these increases the risk of percutaneous coronary intervention (PCI) [3, 16]. PCI also has its own risks, including exposure to contrast dye, cholesterol embolization, adjunctive antithrombotic agents, and risk of bleeding from arterial injury [17].

In the Primary Angioplasty in Myocardial Infarction (PAMI-I) study [18], 38% of patients were ≥65 years of age and 20.5% were ≥70 years of age. Patients who underwent PCI versus fibrinolytic therapy had a trend toward fewer in-hospital deaths (2.6% versus 6.5%; P=0.06) and less death or recurrent MI (5.1% versus 12.0%; P=0.02) [18]. In the elderly subgroup (≥65 years of age), PCI was also associated with a lower composite of death or MI (8.6% versus 20.0%, P=0.048) [19]. The Global Use of Strategies to Open Occluded Coronary Arteries in Acute Coronary Syndromes-IIb (GUSTO-IIb) trial also showed a trend toward a lower 30-day mortality rate with PCI than fibrinolytic therapy among patients ≥70 years of age [20]. The Primary Coronary Angioplasty Trialists (PCAT) investigators studied 11 randomized trials of PCI versus fibrinolytic therapy (n=2635). PCI was favored for reducing the 30-day mortality rate (13.3% versus 23.6%; P<0.05) among patients ≥70 years of age (n=640)

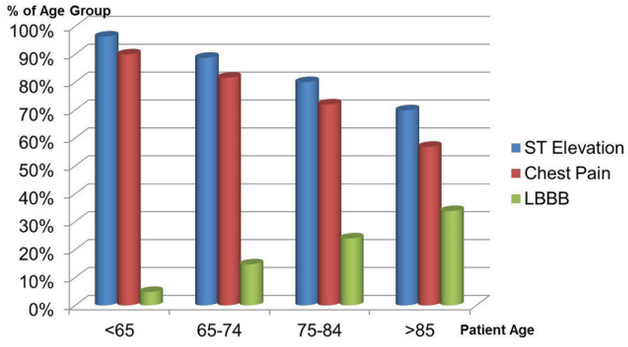

Figure 1. Clinical presentation of STEMI in age group (NRMI registry [10]). LBBB; Left Bundle Branch Block, NRMI; National Registry of Myocardial Infarction, STEMI; ST-segment Elevation Myocardial Infarction.

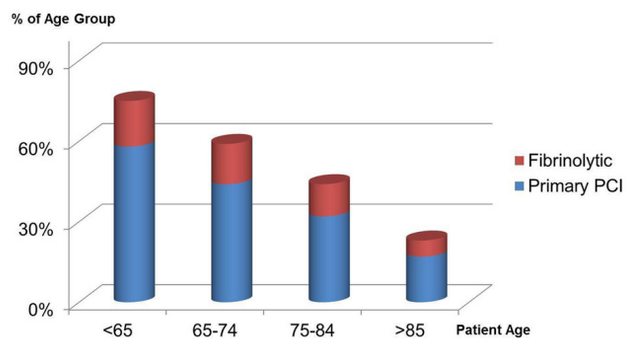

Figure 2. Reperfusion strategy for STEMI in age group (NRMI registry [10]). NRMI; National Registry of Myocardial Infarction, PCI; Percutaneous Coronary Intervention, STEMI; ST-segment Elevation Myocardial Infarction.

[21]. In addition to the randomized clinical trials, observational studies have showed that primary PCI had a trend toward lower mortality than thrombolytic therapy in elderly patients with STEMI [6, 22-25]. PCI is also an effective strategy in preventing reinfarction and future revascularization. Risk–benefit ratio favors PCI over fibrinolytic therapy in the elderly in small randomized trials, meta-analyses, and observational studies, but more data are needed in patients ≥80 years of age [5, 6, 17].

The timing and availability of PCI are crucial for the clinical outcomes. The Primary Angiography in patients transferred from General community hospitals to specialized PTCA Units with or without Emergency thrombolysis-2 (PRAGUE-2) trial found no difference in both death and MI with PCI or fibrinolytic therapy within 3 hours from symptom onset (7.4% versus 7.3%) [26]. The Comparison of Angioplasty and Prehospital Thrombolysis in Acute Myocardial Infarction (CAPTIM) trial showed that fibrinolytic therapy had a mortality advantage if this therapy interval shortened to 2 hours (2.2% versus 5.7%; P=0.058) [27]. On the other hand, the Beyond 12 hours' Reperfusion AlternatiVe Evaluation (BRAVE-2) trial found that delayed PCI (>12 hours from symptom onset) in STEMI patients still reduced infarct size [28]. The mortality rate for STEMI patients with shock is high [29]. The small number of elderly patients (n=56 ≥75 years of age) enrolled in the SHould we emergently revascularize Occluded Coronaries for cardiogenic shocK (SHOCK) trial. Elderly group did not benefit from revascularization, but this benefit was only observed among patients age <75 years of age. On the other hand, elderly patients with shock who were clinically selected in the SHOCK registry to undergo early revascularization (n=44) had a >50% lower mortality compared with those that underwent late or no revascularization [30, 31].

Finally, PCI is favored strategy in elderly patients because it can be applied in the uncommon clinical presentation including absence of clear ST-segment elevation or chest pain and is effective at delayed presentation. However treatment strategy should be individualized.

Conclusion

Patient heterogeneity, atypical clinical presentations, and limited trials are major subject in management of acute myocardial infarction in the elderly patients. The selection between fibrinolytics or PCI is determined by time from presentation, hemodynamic status such as shock, and comorbidity. PCI and fibrinolytic therapy have similar outcomes when delivered within 3 hours from symptom onset, but PCI seems preferable past 6 hours and still affects myocardial salvage after 12 hours from symptom onset. Thus, availability and time to reperfusion are key determinants of myocardial salvage and clinical benefits regardless of strategy.

Competing interests

The authors declare that they have no competing interests.

References

1. Alexander KP, Newby LK, Cannon CP, Armstrong PW, Gibler WB, Rich MW et al. Acute coronary care in the elderly, part I: Non-ST-segment-elevation acute coronary syndromes: a scientific statement for healthcare professionals from the American Heart Association Council on Clinical Cardiology: in collaboration with the Society of Geriatric Cardiology. Circulation 2007;115(19):2549-69.
2. Cusack BJ. Pharmacokinetics in older persons. Am J Geriatr Pharmacother 2004;2(4):274-302.
3. Wang TY, Gutierrez A, Peterson ED. Percutaneous coronary intervention in the elderly. Nat Rev Cardiol 2011;8(2):79-90.
4. Alexander KP, Roe MT, Chen AY, Lytle BL, Pollack CV Jr, Foody JM et al. Evolution in cardiovascular care for elderly patients with non-ST-segment elevation acute coronary syndromes: results from the CRUSADE National Quality Improvement Initiative. J Am Coll Cardiol 2005;46(8):1479-87.
5. Alexander KP, Newby LK, Armstrong PW, Cannon CP, Gibler WB, Rich MW et al. Acute coronary care in the elderly, part II: ST-segment-elevation myocardial infarction: a scientific statement for healthcare professionals from the American Heart Association Council on Clinical Cardiology: in collaboration with the Society of Geriatric Cardiology. Circulation 2007;115(19):2570-89.
6. Mehta RH, Granger CB, Alexander KP, Bossone E, White HD, Sketch MH Jr. Reperfusion strategies for acute myocardial infarction in the elderly: benefits and risks. J Am Coll Cardiol 2005;45(4):471-8.
7. Mehta RH, Rathore SS, Radford MJ, Wang Y, Krumholz HM. Acute myocardial infarction in the elderly: differences by age. J Am Coll Cardiol 2001;38(3):736-41.
8. Yarzebski J, Goldberg RJ, Gore JM, Alpert JS. Temporal trends and factors associated with extent of delay to hospital arrival in patients with acute myocardial infarction: the Worcester Heart Attack Study. Am Heart J 1994;128(2):255-63.
9. Gurwitz JH, McLaughlin TJ, Willison DJ, Guadagnoli E, Hauptman PJ, Gao Xet al. Delayed hospital presentation in patients who have had acute myocardial infarction. Ann Intern Med 1997;126(8):593-9.
10. A report from the National Registry of Myocardial Infarction. (NRMI) 2-4. ST-segment depression on the initial electrocardiogram in acute myocardialinfarction-prognosticsignificance and its effect on short-term mortality:Am J Cardiol 2005;95(7):843-8.
11. Eagle KA, Goodman SG, Avezum A, Budaj A, Sullivan CM, Lopez-Sendon J. Practice variation and missed opportunities for reperfusion in ST-segment-elevation myocardial infarction: findings from the Global Registry of Acute Coronary Events (GRACE). Lancet 2002;359(9304):373-7.
12. Wallentin L, Goldstein P, Armstrong PW, Granger CB, Adgey AA, Arntz HR et al. Efficacy and safety of tenecteplase in combination with the low-molecular-weight heparin enoxaparin or unfractionated heparin in the prehospital setting: the Assessment of the Safety and Efficacy of a New Thrombolytic Regimen (ASSENT)-3 PLUS randomized trial in acute myocardial infarction. Circulation 2003;108(2):135-42.
13. Brass LM, Lichtman JH, Wang Y, Gurwitz JH, Radford MJ, Krumholz HM. Intracranial hemorrhage associated with thrombolytic therapy for elderly patients with acute myocardial infarction: results from the cooperative cardiovascular project. Stroke 2000;31(8):1802-11.
14. Gusto Investigators. An international randomized trial comparing four thrombolytic strategies for acute myocardial infarction. N Engl J Med 1993;329(10):673-82.
15. Simoons ML, Maggioni AP, Knatterud G, Leimberger JD, de Jaegere P, van Domburg R et al. Individual risk assessment for intracranial haemorrhage during thrombolytic therapy. Lancet 1993;342(8886-8887):1523-8.
16. Batchelor WB, Anstrom KJ, Muhlbaier LH, Grosswald R, Weintraub WS, O'Neill WW et al. Contemporary outcome trends in the elderly undergoing percutaneous coronary interventions: results in 7,472 octogenarians. National Cardiovascular Network Collaboration. J Am Coll Cardiol 2000;36(3):723-30.
17. 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(9351):13-20.
18. Grines CL, Browne KF, Marco J, Rothbaum D, Stone GW, O'Keefe J et al. A comparison of immediate angioplasty with thrombolytic therapy for acute myocardial infarction. The primary angioplasty in myocardial ınfarction study group. N Engl J Med 1993;328(10):673-9.
19. Stone GW, Grines CL, Browne KF, Marco J, Rothbaum D, O'Keefe J et al. Predictors of in-hospital and 6-month outcome after acute myocardial infarction in the reperfusion era: the Primary angioplasty in myocardial ınfarction (PAMI) trail. J Am Coll Cardiol 1995;25(2):370-7.
20. The Global Use of Strategies to Open Occluded Coronary Arteries in Acute Coronary Syndromes (GUSTO IIb) Angioplasty Substudy Investigators. A clinical trial comparing primary coronary angioplasty with tissue plasminogen activator for acute myocardial infarction. N Engl J Med 1997;336(23):1621-8.
21. Grines C, Patel A, Zijlstra F, Weaver WD, Granger C, Simes RJ. PCAT Collaborators. Primary coronary angioplasty compared with intravenous thrombolytic therapy for acute myocardial infarction: six-month follow up and analysis of individual patient data from randomized trials. Am Heart J 2003;145(1):47-57.
22. Berger AK, Schulman KA, Gersh BJ, Pirzada S, Breall JA, Johnson AE et al. Primary coronary angioplasty vs thrombolysis for the management of acute myocardial infarction in elderly patients. JAMA 1999;282(4):341-8.
23. Zahn R, Schiele R, Schneider S, Gitt AK, Wienbergen H, Seidl K et al. Primary angioplasty versus intravenous thrombolysis in acute myocardial infarction: can we define subgroups of patients benefiting most from primary angioplasty? Results from the pooled data of the Maximal Individual Therapy in Acute Myocardial Infarction Registry and the Myocardial Infarction Registry. J Am Coll Cardiol 2001;37(7):1827-35.
24. Tiefenbrunn AJ, Chandra NC, French WJ, Gore JM, Rogers WJ. Clinical experience with primary percutaneous transluminal coronary angioplasty compared with alteplase (recombinant tissue-type plasminogen activator) in patients with acute myocardial infarction: a report from the Second National Registry of Myocardial Infarction (NRMI-2). J Am Coll Cardiol 1998;31(6):1240-5.
25. Mehta RH, Sadiq I, Goldberg RJ, Gore JM, Avezum A, Spencer F et al. Effectiveness of primary percutaneous coronary intervention compared with that of thrombolytic therapy in elderly patients with acute myocardial infarction. Am Heart J 2004;147(2):253-9.
26. Widimsky P, Budesinsky T, Vorac D, Groch L, Zelízko M, Aschermann M et al.

'PRAGUE' Study Group Investigators. Long distance transport for primary angioplasty vs immediate thrombolysis in acute myocardial infarction. Final results of the randomized national multicentre trial-PRAGUE-2. Eur Heart J 2003;24(1):94-104.
27. Steg PG, Bonnefoy E, Chabaud S, Lapostolle F, Dubien PY, Cristofini P et al. Comparison of Angioplasty and Prehospital Thrombolysis in Acute Myocardial Infarction (CAPTIM) Investigators. Impact of time to treatment on mortality after prehospital fibrinolysis or primary angioplasty: data from the CAPTIM randomized clinical trial. Circulation 2003;108(23):2851-6.
28. Schomig A, Mehilli J, Antoniucci D, Ndrepepa G, Markwardt C, Di Pede F et al. Beyond 12 Hours Reperfusion AlternatiVe Evaluation (BRAVE-2) Trial Investigators. Mechanical reperfusion in patients with acute myocardial infarction presenting more than 12 hours from symptom onset: a randomized controlled trial. JAMA 2005;293(23):2865-72.
29. Hochman JS, Buller CE, Sleeper LA, Boland J, Dzavik V, Sanborn TA et al. Cardiogenic shock complicating acute myocardial infarction etiologies, management and outcome: a report from the SHOCK Trial Registry. SHould we emergently revascularize Occluded Coronaries for cardiogenic shocK? J Am Coll Cardiol 2000;36(Suppl.3A):S1063-70.
30. Dzavik V, Sleeper LA, Cocke TP, Moscucci M, Saucedo J, Hosat S et al. Early revascularization is associated with improved survival in elderly patients with acute myocardial infarction complicated by cardiogenic shock: a report from the SHOCK Trial Registry. Eur Heart J 2003;24(9):828-37.
31. Dauerman HL, Ryan TJ Jr, Piper WD, Kellett MA, Shubrooks SJ, Robb JF et al. Outcomes of percutaneous coronary intervention among elderly patients in cardiogenic shock: a multicenter, decade-long experience. J Invasive Cardiol 2003;15(7):380-4.