



## 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 kullanılsa 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 müdahalenin sonuçlarını derlemektedir.

#### Anahtar Kelimeler

Yaşlı; Müdahale; Miyokard 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-related 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]. Pre-hospital 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 (NRM) 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 NRM 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].

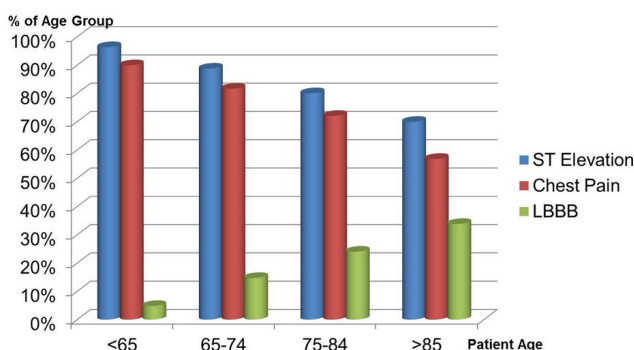


Figure 1. Clinical presentation of STEMI in age group (NRM registry [10]). LBBB; Left Bundle Branch Block, NRM; National Registry of Myocardial Infarction, STEMI; ST-segment Elevation Myocardial Infarction.

Therefore older age is associated with delayed presentation as well as the increased risk of adverse outcomes [5, 6].

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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 NRM 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-specific 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 ( $n=640$ )

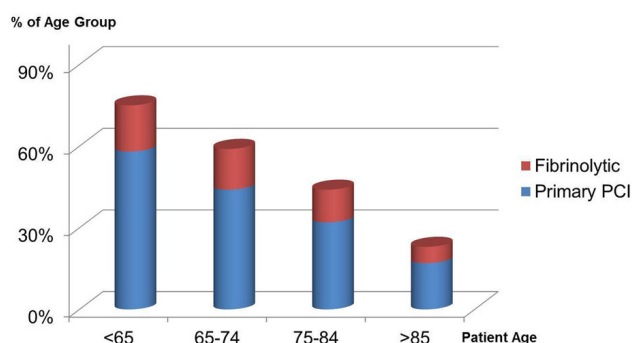


Figure 2. Reperfusion strategy for STEMI in age group (NRM registry [10]). NRM; National Registry of Myocardial Infarction, PCI; Percutaneous Coronary Intervention, STEMI; ST-segment Elevation Myocardial Infarction.

[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  $\geq 80$  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 ( $n=56 \geq 75$  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.

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