Editorial / *Editöryal Yorum*

Primary percutaneous coronary intervention in octogenarians

Seksenli yaşlarda primer perkütan koroner girişim

Ertan Ökmen, M.D.

Department of Cardiology, Anadolu Medical Center, Kocaeli

The elderly constitute an increasing proportion of patients presenting with acute coronary syndrome (ACS), and advanced age is a strong predictor of adverse outcomes. Recently, the Western Denmark Heart Registry analysis of primary percutaneous coronary intervention (PCI) in octogenarians and nonagenarians with ST-segment elevation myocardial infarction (STEMI) showed that a total of 1,322 elderly patients (1,213 octogenarians and 109 nonagenarians) were treated with primary PCI, which corresponds to 11.6% of the total primary-PCI–treated STEMI population.[1] The investigators also noted an increasing proportion of octogenarians treated with primary PCI, from 6.2% in 2002 to 11.8% in 2009. This trend is consistent with the study published in the current issue of Archives of the Turkish Society of Cardiology. Oduncu et al.[2] reported that 8.1% of the primary PCI population consisted of patients aged ≥80 years, in a high- volume Turkish center.

The optimal reperfusion strategy in elderly patients with STEMI remains under debate because these patients, although numerically growing, are excluded from, or underrepresented in most of the clinical trials, and little data are available. Evidence has been extrapolated from studies in younger patients, which precludes extending the study findings to the population that experiences the most morbidity and death from ACS. Although the guidelines recommend that STEMI patients be treated with reperfusion strategy and that the patient's age should not influence decisions about cardiac care, older age is the most important factor associated with failure to receive it. As a consequence, these patients are typically treated less aggressively than are younger patients, due partly to the increased risk of adverse events and partly to a lack of standard management guidelines.

Abbreviations:

ACS	Acute coronary syndrome
CIN	Contrast induced nephropathy
MACE	Major adverse cardiac events
PCI	Percutaneous coronary intervention
STEMI	ST-segment elevation myocardial infarction
TIMI	Thrombolysis in myocardial infarction

Elderly patients often present with pre-hospital delays preventing prompt treatment, atypical symptoms, long pain-to-door times, heart failure, non-diagnostic electrocardiograms, and multiple comorbidities including chronic kidney disease, anemia and cancer, which increase the risks associated with PCI. According to the National Registry of Myocardial Infarction, chest pain at presentation occurred in 89.9% of STEMI patients <65 years of age versus 56.8% of those ≥85 years of age.[3] 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 the elderly population, and it accounts for more than one-third of ECGs among patients ≥85 years of age.

Additionally, the technical feasibility of performing PCI in elderly patients has been frequently questioned, because severe coronary calcification, complex multivessel disease and tortuous vascular anatomy make coronary and vascular approaches difficult. Data from a large registry showed that patients >85 years old are less likely to achieve TIMI flow grade 3 (flow grades based on results of the Thrombolysis in Myocardial Infarction trial) after PCI and are more likely to have PCI

Correspondence: Dr. Ertan Ökmen. Anadolu Sağlık Merkezi, Cumhuriyet Sokak,
No: 2255, 41400 Gebze, Kocaeli, Turkey.
Tel: +90 262 - 678 50 86   e-mail: ertanokmen@hotmail.com

complications, with a 30-day mortality of 20.4%.[4] PCI in the elderly also has its own risks, including exposure to contrast dye, cholesterol embolization, adjunctive antithrombotic agents, and risk of bleeding from arterial injury. In a contemporary population of STEMI patients treated with PCI, overall in-hospital major adverse cardiac events (MACE) and mortality remain higher in the elderly compared to younger patients.[5]

Despite these problems, evidence from the medical literature shows that PCI may be a viable treatment option in elderly patients, especially compared with fibrinolytic treatment, as a reperfusion strategy.[6] In this issue of the Journal, Oduncu et al. evaluated retrospectively the efficacy and in-hospital and late events following primary PCI in patients with STEMI aged ≥80 years, compared to younger counterparts, by enrolling totally 2213 patients. The patients were followed up for a median of 42 months. They showed that PCI can be technically successful in octogenarians for STEMI with a success rate of over 93.2% (PCI was unsuccessful in only 13 patients [6.8%]).

In the detailed evaluation, the patients over 80 years had significant baseline high-risk demographic and clinical features, such as diabetes, hypertension, renal failure, anemia, cardiogenic shock, cognitive dysfunction, peripheral artery disease, longer pain-to-balloon time, and higher baseline brain natriuretic peptide (BNP) and C-reactive protein (CRP) levels. These elderly patients not only have the pre-interventional high-risk characteristics for in-hospital and long- term major cardiac events, but they also have poor interventional characteristics including tortuous peripheral arteries, extensive coronary artery disease, poor collateral circulation, worse interventional success, and lower rates of post-procedural TIMI-3 blod flow, myocardial blush grade and ST-segment resolution. Accordingly, it is not surprising to have higher in-hospital mortality (14.5% *vs.* 3.5%), heart failure (20.7% *vs.* 10.5%), major hemorrhage (9.5% *vs.* 3.3%), mechanical complications (3.4% *vs.* 0.7%), contrast-induced nephropathy (CIN) (31.8% *vs.* 12.2%), requirement of blood transfusion, and arrhythmic complications, as well as long-term major cardiac and non-cardiac events compared to relatively younger individuals (1-year mortality [29.7% *vs.* 7.0%] and stroke [4.1% *vs.* 0.7%] and long-term all-cause mortality [40% *vs.* 9.7%] and stroke [5.6% *vs.* 1.1%]). The mortality findings of this study are very similar to those of the recent Danish study, which showed octogenarians had remarkably high 30-day, 1-year, and 5-year mortality rates (17.2%, 27.6%, and 53.6%, respectively).[1]

Oduncu et al. reported that age ≥80 years was an independent predictor of long-term mortality. In addition to the advanced age, female gender, baseline anemia, major hemorrhage, renal failure, incomplete ST-segment resolution, post-procedural left ventricle (LV) systolic dysfunction, and baseline BNP level also independently predicted long-term mortality in patients with advanced age. One of the most important findings of this study is that although it is impossible to modify the initial high-risk demographic characteristics, most of the independent predictors for long-term events including anemia, major hemorrhage and CIN are to some extent modifiable, and when treated appropriately, the outcome could be improved.

The physicians must be aware that PCI is an effective revascularization strategy to save elderly patients, but careful pre-intervention evaluation, early detection of anemia and kidney dysfunction, measures to decrease the volume of the contrast media during the intervention, and particularly prevention of access site bleeding should be regarded as vital as opening the coronary artery, particularly considering the effects of these factors on long-term mortality. It should be kept in mind that in the current study, one-third of the patients developed CIN (31%), and even in younger patients, the frequency of CIN was also not low (12%).[2] CIN is known to be associated both with urgent procedures and with advanced age. The volume of the contrast media used during urgent coronary intervention tends to be relatively higher than in elective procedures. Accordingly, a good hydration, attempt to keep the contrast volume low, and N-acetylcysteine treatment should be an essential part of the primary PCI in elderly patients.

The authors stated that half of the eldery patients have baseline anemia, 9.5% of them had major bleeding, and 19% needed transfusion during the in-hospital period. Bleeding is a significant predictor of early and long-term events, especially in a patient group that already has a high frequency (51%) of baseline anemia. The anticoagulant and antiaggregant treatment accordingly should be tailored in patients over 80 years of age. Although elderly patients are at a higher risk for bleeding complications after PCI when performed through the femoral approach, the transradial approach in primary PCI seems safe and feasible in elderly patients with STEMI. It has been shown that

transradial primary percutaneous intervention, particularly by preventing access site bleeding, is associated with a significant mortality advantage over the femoral approach.[7] The RIVAL investigators showed a significantly lower rate of vascular complications in a randomized, parallel group, multicenter study and in patients undergoing PCI for STEMI, resulting in a reduction in overall mortality in the radial access group.[8] A recent meta-analysis of nine other large studies of access site selection in patients undergoing primary PCI showed a significant reduction in mortality, major MACE and major access site complications in the transradial groups.[9] The transradial approach may also increase the success rate of primary PCI in the elderly by surpassing the procedural problems related with peripheral artery disease (which is very frequent over 80 years of age), and may overcome the difficulty in passing through tortuous femoral, iliac, abdominal, and thoracic aortae. The elongated and tortuous aorta may prevent good guiding catheter support, which is very important in patients who frequently have complex disease. The transradial approach, particularly when performed through the left radial artery, may provide better guiding catheter support and consequently better procedural success.

The present retrospective study points out the challenge of managing elderly patients presenting with STEMI. There is significant controversy surrounding the treatment of octogenarians that present with STEMI, given the observed risk of complications with increasing age, the paucity of trials proving the benefits of revascularization, and the relatively poor early and late outcomes. Older cohorts are considered to have lower overall life expectancy and numerous comorbidities that may contribute to adverse events unrelated to the revascularization procedure. However, on the basis of current evidence, the decision to perform PCI should not be based on chronological age alone, but rather on each patient's general eligibility for revascularization and the clinical circumstances as a whole. Primary PCI in elderly patients warrants close observation, meticulous attention to adjunct pharmacological therapy, and treatment of correctable comorbidities such as anemia, CIN and bleeding. Considering these facts, we look forward to future trials that may employ strategies to improve the safety profile of PCI, including tailored anticoagulation regimens and alternative access sites. Finally, the present study by Oduncu et al. continues to suggest that PCI can be performed in a very elderly population with reasonable success, but short- and long-term adverse event rates including mortality are still significant.

Conflict-of-interest issues regarding the authorship or article: None declared

REFERENCES

1. Antonsen L, Jensen LO, Terkelsen CJ, Tilsted HH, Junker A, Maeng M, et al. Outcomes after primary percutaneous coronary intervention in octogenarians and nonagenarians with ST-segment elevation myocardial infarction: From the Western Denmark heart registry. Catheter Cardiovasc Interv 2013;81:912-9. **[CrossRef]**

2. Oduncu V, Erkol A, Tanalp AC, Kirma C, Bulut M, Bitigen A, et al. Comparison of early and late clinical outcomes in patients ≥80 versus <80 years of age after successful primary angioplasty for ST segment elevation myocardial infarction. Turk Kardiyol Dern Ars 2013;41:319-28.

3. Pitta SR, Grzybowski M, Welch RD, Frederick PD, Wahl R, Zalenski RJ. ST-segment depression on the initial electrocardiogram in acute myocardial infarction-prognostic significance and its effect on short-term mortality: A report from the National Registry of Myocardial Infarction (NRMI-2, 3, 4). Am J Cardiol 2005;95:843-8. **[CrossRef]**

4. Dziewierz A, Siudak Z, Rakowski T, Dubiel JS, Dudek D. Age-related differences in treatment strategies and clinical outcomes in unselected cohort of patients with ST-segment elevation myocardial infarction transferred for primary angioplasty. J Thromb Thrombolysis 2012;34:214-21. **[CrossRef]**

5. Hafiz AM, Jan MF, Mori N, Gupta A, Bajwa T, Allaqaband S. Contemporary clinical outcomes of primary percutaneous coronary intervention in elderly versus younger patients presenting with acute ST-segment elevation myocardial infarction. J Interv Cardiol 2011;24:357-65. **[CrossRef]**

6. Grines C, Patel A, Zijlstra F, Weaver WD, Granger C, Simes RJ; PCAT Collaborators. Percutaneous transluminal coronary angioplasty. 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;145:47-57.

7. Arzamendi D, Ly HQ, Tanguay JF, Chan MY, Chevallereau P, Gallo R, et al. Effect on bleeding, time to revascularization, and one-year clinical outcomes of the radial approach during primary percutaneous coronary intervention in patients with ST-segment elevation myocardial infarction. Am J Cardiol 2010;106:148-54. **[CrossRef]**

8. Jolly SS, Yusuf S, Cairns J, Niemelä K, Xavier D, Widimsky P, et al. Radial versus femoral access for coronary angiography and intervention in patients with acute coronary syndromes (RIVAL): a randomised, parallel group, multicentre trial. Lancet 2011;377:1409-20. **[CrossRef]**

9. Mamas MA, Ratib K, Routledge H, Fath-Ordoubadi F, Neyses L, Louvard Y, et al. Influence of access site selection on PCI-related adverse events in patients with STEMI: meta-analysis of randomised controlled trials. Heart 2012;98:303-11.