A Very Elderly Woman Experiencing Two Episodes of Acute Myocardial Infarction Treated by Percutaneous Coronary Intervention: A Case Report and Literature Review

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SUMMARY

Advanced age is associated with poor outcome among patients with acute myocardial infarction (AMI). It appears that elderly patients are treated more conservatively because of multiple comorbidities and higher risk of further invasive therapy. Reperfusion therapy for AMI may improve survival, and previous studies have shown that patients receiving percutaneous coronary intervention (PCI) have better clinical outcomes than those given thrombolytic therapy. We report our experience with a 96-year-old woman with anteroseptal wall ST-segment elevation myocardial infarction successfully treated with primary PCI. One stent was implanted in the left anterior descending artery occlusive lesion. The patient survived and was discharged from the hospital 7 days later. She received optimal medical therapy and had no major adverse cardiac events within 1 year. Unfortunately, the patient had non-ST-segment elevation myocardial infarction 18 months later. We discussed with her family about the risk/benefit ratio of PCI, and they agreed with the procedure. We performed PCI successfully and the patient was discharged 5 days later. No major adverse cardiac events occurred within 4 months. In very elderly patients without multiple comorbidities, PCI is safe for AMI and effective in shortening hospital stay, reducing in-hospital and short-term mortality. We also discuss our strategy for this very elderly patient and the present therapy for AMI in nonagenarians. [International Journal of Gerontology 2010; 4(3): 148–153]

Key Words: elderly, myocardial infarction, percutaneous transluminal coronary angioplasty

Introduction

The number of very elderly (aged 90 years or older) patients is progressively increasing1. Patients with acute myocardial infarction (AMI) in this age group have a high mortality because elderly patients have more late presentations, comorbidities, congestive heart failure, presence of acute coronary syndrome, and complex coronary arterial anatomy than their younger counterparts1. We report a patient who had two episodes of AMI successfully treated with percutaneous coronary intervention (PCI). The patient survived without any major adverse cardiac events (composite of death, Q-wave myocardial infarction, and target vessel revascularization) before and after hospital discharge. We review the present literature regarding appropriate therapy for nonagenarians with AMI.
Case Presentation

A 96-year-old female patient had no established systemic diseases. She had suffered from chest tightness extending to the shoulder for 1 hour by the time of arrival at our emergency department. On arrival, the patient’s vital signs were as follows: pulse rate 80 beats/minute; respiratory rate 20 breaths/minute; and blood pressure 145/60 mmHg. Physical examination of the patient revealed inspiratory crackles of the bilateral lung field. An electrocardiogram showed ST-segment elevation in leads V1-4, II, III and aVF (Figure 1). Chest radiography demonstrated diffuse bilateral lower interstitial infiltration, compatible with pulmonary edema. Blood tests showed normal electrolytes; creatinine, 1.1 (0.5–0.9) mg/dL; creatine kinase, 34 U/L with MB fraction, 22 U/L; troponin-I, 0.3 (<0.01) μg/L; low-density lipoprotein cholesterol 95 mg/dL; and hemoglobin, 11.3 g/dL. The application of thrombolytic therapy in this patient was discounted owing to a high bleeding risk. The risk of bleeding was related to the patient’s old age, female sex, and very low body weight (27 kg). An emergency PCI was arranged after obtaining written informed consent. We performed coronary angiography (CAG) and PCI by the right femoral approach, using a 6 French guiding catheter. The CAG revealed total occlusion of the middle part of the left anterior descending artery (Figure 2A), patent left circumflex artery, and 80% stenosis of the

![Figure 1. Electrocardiogram demonstrating 1-mm to 4-mm ST-segment elevations in leads V1-4, II, III and aVF.](image)

![Figure 2. (A) Coronary angiography revealing total occlusion of the middle part of the left anterior descending artery (black arrow). (B) Repeat coronary angiography following successful percutaneous coronary intervention of the left anterior descending artery.](image)
middle part of the right coronary artery. The target vessel revascularization was performed by stenting of the left anterior descending artery (Figure 2B). The patient’s chest pain subsided after the PCI procedure. Transthoracic echocardiography 5 days after AMI showed mild hypokinesis of the anteroseptal wall of the left ventricle with an estimated ejection fraction of 53%. The peak values of creatinine kinase and its MB fraction were 708 U/L and 167 U/L, respectively. The patient was discharged 7 days after admission. She had regular outpatient follow-up and received optimal medications, including aspirin, clopidogrel, lipid-lowering agent, nicorandil, β-blocker and a renin-angiotensin system inhibitor. She had no major adverse cardiac events within 1 year.

Unfortunately, the patient returned to the emergency department with chest tightness and a poor response to sublingual nitroglycerin over 2 days. The electrocardiogram revealed atrial premature complex without significant ST-segment deviation (Figure 3). The troponin-I level was 0.12 μg/L. She was diagnosed with non-ST segment elevation myocardial infarction (NSTEMI) and admitted to the intensive care unit. The transthoracic echocardiography showed mild hypokinesis of the inferior wall of the left ventricle with estimated ejection fraction of 59%. The thrombolysis in myocardial infarction risk score for NSTEMI in our patient was 5 points (age > 65 years, coronary stenosis ≥ 50%, elevated troponin-I, aspirin use in last 7 days, > 2 angina events within the previous 24 hours). The patient fell into a high-risk category and early PCI was indicated. The family consented to PCI after we discussed the overall risks and benefits of this procedure. The CAG revealed 85% stenosis of the middle part of the right coronary artery (Figure 4A). Direct stenting completely covering this irregular plaque was performed successfully (Figure 4B). The symptoms of this patient improved and she was discharged 5 days later. During the 4-month follow-up period, the patient has remained free of symptoms without any cardiovascular event.

Discussion

Ischemic heart disease is the leading cause of death among elderly populations. It was reported that 83% of those dying from ischemic heart disease were > 65 years of age and that short-term and long-term mortality after AMI increased with advancing age. There are very few reports regarding the results of reperfusion therapy in nonagenarians (patients aged ≥ 90 years) with AMI.

Reperfusion therapy, including thrombolytic therapy or PCI, is an effective treatment for patients with STEMI. Old age is usually a determinant factor for not using reperfusion therapy. The use of thrombolytic therapy with no reperfusion in the elderly was compared in

Figure 3. Electrocardiogram demonstrating atrial premature complex without significant ST-segment deviation.
previous registries. Intravenous thrombolysis decreases mortality among elderly patients. However, the risk of intracranial hemorrhage (ICH) increases with age (2.9% for those > 85 years old). ICH is also associated with elevated diastolic pressure (≥ 95 mmHg), female sex, recent head trauma, diabetes, prior cerebrovascular disease, low body weight (< 70 kg), and fibrin-specific agents (tissue plasminogen activator, tPA). Our patient had three risk factors for ICH. In the Assessment of the Safety and efficacy of a New Thrombolytic (ASSENT-2) trial, tenecteplase (TNK-tissue plasminogen activator [TNK-tPA]) was associated with a lower rate of ICH (1.1%) compared with tPA (3%) in the elderly. In the ASSENT-3 Plus trial, a lower rate of ICH was seen with unfractionated heparin (1.2%) as opposed to enoxaparin (6.7%) when administered with tenecteplase in the elderly. Tenecteplase and unfractionated heparin may be suitable for elderly patients according to the results of ASSENT-2/ASSENT-3 Plus. Our patient arrived at the emergency department within the first 3 hours after the onset of symptoms, thus was eligible for both thrombolysis and primary PCI, according to the current American College of Cardiology-American Heart Association guidelines. Although this patient had no absolute contraindications for the use of thrombolytic agents, we did not give TNK-tPA as this patient was at high risk of ICH. Also, the cardiac catheterization services are available 24 hours per day in our institution. Primary PCI is associated with significant clinical benefit when compared with thrombolytic therapy in small randomized trials, meta-analyses and observational studies. Although a few trials comparing primary PCI with fibrinolytic therapy in older patients have been reported, more data are needed in patients ≥ 80 years of age. The major clinical benefit of primary PCI is a reduction in reinfarction and target vessel revascularization. The reduction in mortality is less significant. We also assumed that complete revascularization by PCI offered greater benefit in patients with anteroseptal STEMI.

The independent predictors of mortality after AMI in nonagenarians in one retrospective analysis included low body mass index (BMI) (< 25 kg/m²), impaired renal function (creatinine ≥ 2.0 mg/dL), anemia (hemoglobin < 11 g/dL), and dementia. Low body weight is more prevalent in nonagenarians. A lower BMI may indicate chronic inflammation, malnutrition, or frailty and correlate with poor outcomes. Our patient had very low BMI (11.7 kg/m²) but denied recent body weight loss or poor food intake. We considered that a stable low body weight might not be associated with poor prognosis. Such patients may tolerate further invasive therapy well if the PCI is performed with a short procedural time, simple technique, and less contrast media.

Reports on PCI in nonagenarians are very rare. Wu et al. reported the results of in-hospital mortality (0%) and major adverse cardiac events (8%) at 6 months of follow-up in 12 nonagenarians after PCI were better than in 6 nonagenarians under medical treatment only. They also concluded that PCI in the elderly can be performed as effectively and safely as in younger patients. Moreno et al. reported 26 nonagenarians undergoing PCI. The PCI achieved a successful angiographic outcome in most patients, but mortality was concentrated in patients with cardiogenic shock or primary PCI for STEMI from left anterior descending artery occlusion. The factors associated with 6-month mortality were urgent PCI, diabetes, blood pressure, thrombolysis in myocardial infarction flow at baseline, left ventricle...
function, renal failure, and procedural success. PCI improved quality of life in the elderly, with relief of angina and increased functional status.

Our patient developed NSTEMI 18 months after the first myocardial infarction. We performed a CAG examination for the following reasons: (1) the thrombolysis in myocardial infarction risk score was high, which indicated greater benefit of early invasive therapy according to studies of a broad range of patient groups, including the elderly; (2) the causes of NSTEMI must be evaluated for further definitive therapy. If in-stent restenosis occurs, we could use intravascular ultrasound to detect its mechanism and use it to guide therapy such as balloon angioplasty, drug-eluting stent implantation or coronary artery bypass surgery (CABG). There is a paucity of data among nonagenarians undergoing PCI with a drug-eluting stent. The authors have reported that PCI with such a stent was safe without inhospital deaths and an acceptable 3-year survival rate (61% ± 9%). However, because of unpredictable compliance to long-term dual antiplatelet therapy in elderly patients, caution should be exercised in the extensive use of the drug-eluting stent. If there is no ISR, it means the result of stent implantation is good and further PCI with a stent is feasible. Our patient underwent a CAG that revealed no in-stent restenosis within the left anterior descending artery 18 months later. We assumed that a restenosis was less likely after another PCI. Although an early invasive strategy for elderly patients with NSTEMI demonstrates greater benefits in reducing death and recurrent myocardial infarction, there is little evidence to guide management in nonagenarians. The elderly populations have more comorbidities, so secondary causes of NSTEMI such as anemia, tachycardia, or sepsis must be considered. Also, functional status, frailty, social aspects of care, bleeding risk with antithrombotic therapies, and contrast medium-induced acute renal failure should be taken into consideration. Careful patient selection and full assessment of the risk-to-benefit ratio is important for the physician to make treatment decisions. It is also mandatory to perform close postprocedural monitoring of the patient's condition.

The European System for Cardiac Operative Risk Evaluation (EuroSCORE) is a scoring system for predicting operative mortality before CABG. The EuroSCORE of our patient was 13 points, which indicated predicted operative mortality of about 35%. The paucity of information about the clinical outcomes for nonagenarians provides little guidance to physicians about the risks and benefits of undergoing a CABG procedure. Bridges et al. reported operative mortality of 11.8% for 663 nonagenarians undergoing CABG. The major predictors of operative mortality in this age group were emergency/salvage CABG, renal failure, preoperative intra-aortic balloon pump, peripheral vascular disease, the presence of mitral regurgitation, and cerebrovascular disease. Lichtman et al. retrospectively analyzed 4,224 nonagenarians (2,068 women, 2,156 men) from the Medicare Enrollment Database who underwent CABG from 1993 to 1999. The mortality after CABG was 13.5% at 1 month, and 26.6% and 59.0% after 1 and 5 years of follow-up, respectively. They also found that short-term mortality trends were comparable for men and women, but men tended toward a higher mortality rate in the 2-year to 5-year results. They had a life expectancy similar to that of their elderly peers.

From this case we learn that primary PCI is always necessary and has an acceptable result in nonagenarians with STEMI, especially of the anteroseptal wall. Thrombolysis is an alternative therapy within 3 hours of symptom onset, but it has a potential risk of ICH. In nonagenarians with NSTEMI, a secondary cause is more frequent and should be carefully excluded. The selection of CABG, PCI with a bare-metal stent/DES, thrombolytics, or no reperfusion therapy depend on the characteristics of the lesions, coronary artery involvement, the patient's underlying illness, the patient's and family's wishes, and quality-of-life outcomes.

References


