

Case report

A conservative and multidisciplinary medical treatment for a centenarian woman with acute coronary syndrome with multivessel coronary disease and heart failure: A case report and literature review

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ABSTRACT

The management of acute coronary syndrome (ACS) and heart failure (HF) in centenarians is specially challenging because these patients suffer from multiple comorbidities, altered anatomy, physiology, and response to medications compared with younger patients. Unfortunately, there are no specific guidelines for this age group. We herein report an experience of treating a woman 101 years of age with ACS and HF, had a complex coronary angiographic procedure, and proved to have coronary artery disease with the involvement of multiple vessels. Due to the very high risk of being treated surgically or by transcatheter coronary interventions, the clinical course became stable with multidisciplinary conservative medical treatment, which resulted in survival and maintenance of quality of life.

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1. Introduction

The number of the oldest range of elderly patients (>85 years of age) is rising and ischemic heart disease is a major cause of death; 83% of patients dying from this disease are older than 65 years of age.¹ The management of acute coronary syndrome (ACS) and heart failure (HF) is challenging in the elderly population because of multiple comorbid conditions, late or atypical presentation,² delayed medical attention, and altered cardiovascular anatomy and physiology. The paucity of guidelines due to limited randomized clinical trials for nonagenarians in these clinical situations made our treatment of a woman aged 101 years with non-ST elevation myocardial infarction (NSTEMI) especially complex. She had a complicated coronary angiographic procedure and proved to have multivessel coronary disease with a very high risk for invasive treatment. We achieved the stabilization of her clinical condition, and she survived from this major cardiac event with our multidisciplinary conservative management. The literature regarding medical management for nonagenarians in these conditions were reviewed and herein presented.

2. Case report

A woman aged 101 years who was able to independently perform daily activities and who was diagnosed with type 2 diabetes mellitus and essential hypertension at the age of 96 was hospitalized in the beginning of 2008 due to increasing drowsiness since 3 days prior to admission with gradual onset of dyspnea on the day of admission. She complained of drowsiness, and physical examination revealed her body weight was only 35 kg, body height was 150 cm, and body mass index (BMI) was 15.6. Her blood pressure was 148/98 mmHg, respiratory rate was 22–24 breaths/minute, and pulse rate was 89 beats/minute. The jugular vein was engorged, and bilateral basal rales were impressed on chest auscultation. A 2/6 systolic murmur was heard over the right upper sternal area and lower extremities were edematous. Positive laboratory data included serum creatine kinase (CPK) at 338 IU/L (normal range: 26–140 IU/L), creatine kinase MB form (CK-MB) at 20.8 u/l (normal: 2.3–9.5 u/l), troponin-I at 13.17 ng/ml (normal: <0.5 ng/ml), blood urea nitrogen at 42 mg/dl, serum creatinine at 1.8 mg/dl, serum hemoglobin at 7.0 g/dl, and hematocrit at 22%. Stool occult blood test was positive. While using a nasal prong (3 L/minute), arterial blood gas revealed pH at 7.22, PaO₂ at 53.1, PCO₂ at 63, HCO₃ at 21.6 and base excess at –6.5. Electrocardiography (ECG) showed normal sinus rhythm, complete right bundle branch block, and ST depression on leads V₂ to V₅. Echocardiography showed an ejection fraction (EF) of 44% estimated by M mode,

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regional hypokinesia on apical areas of the posterior, lateral, and anterior walls of left ventricle, sclerosis on the aortic and mitral valve leaflets, mild to moderate aortic valve stenosis, and mild aortic, mitral, and tricuspid valve regurgitation.

As NSTEMI with respiratory failure was impressed, she was intubated and supported by mechanical ventilation. Dual oral antiplatelet therapy with clopidogrel and aspirin, intravenous furosemide with dosage adjusted to urine output, intravenous nitroglycerine, morphine as necessary to control chest pain, were given. Oral enalapril was started. Atorvastatin 10 mg qd for control of hyperlipidemia was given because her cholesterol level was 238 mg/dl and low-density lipoprotein cholesterol was 162 mg/dl. Glycemia was controlled by regular insulin scale. Intravenous glycoprotein IIb/IIIa inhibitors (GP IIb/IIIa inhibitor) and anti-thrombin therapy such as unfractionated heparin (UFH) or low molecular weight heparin (LMWH) were not given as gastrointestinal bleeding was suspected based on positive stool occult blood and anemia. Anemia was corrected by packed red blood cell transfusion. Intravenous lansoprazole was given, and endoscopic evaluation was not performed due to ongoing ACS. Her consciousness recovered a day later, but angina was still intermittent. Her NSTEMI/unstable angina (UA) TIMI risk score was 6, an early coronary angiography (CAG) was thus indicated. Approached initially through the left radial artery using a 6 Fr sheath, the 5-Fr catheter failed to cross the brachial artery because of severe tortuosity and atherosclerotic stenosis of this artery (Fig. 1A). We changed access to the right femoral artery. As the advancement of catheters was complicated by excessive tortuosity of the abdominal aorta and aortic arch (Fig. 1B), the engagement of catheters to coronary arteries was difficult. The CAG revealed triple vessel disease (Fig. 2). The SYNTAX score for the multivessel and left main coronary artery intervention was 33, which means high risk and complexity should be treated by percutaneous coronary interventions (PCI). Evaluated by the cardiovascular surgeon, the European System for Cardiac Operative Risk Evaluation Score (EuroScore) resulted in 16 points, equivalent to a mortality rate of 66%. Because of the estimated high risk for both invasive therapies, conservative treatment was decided with the patient's and her family's agreement. Fluid and electrolytes status and hemoglobin levels were closely monitored, and she was successfully weaned from ventilator after 5 days. Subsequently, we started oral bisoprolol and isosorbide-5-mononitrates. We shifted insulin to oral antidiabetic agents for diabetes mellitus control. She was finally discharged after 2 weeks of hospitalization without major discomfort.

On outpatient follow-up, multidisciplinary re-evaluation included a cardiologist, nephrologist, dietitian, pharmacist, and physical therapist as well as the adjustment of medications in the intervals of 2 weeks to 2 months and frequent education to her family regarding diet and daily care. In the following 3 years, she was able to carry on daily activities by herself with minimal help from her daughter without major discomfort. Although she was rehospitalized three times because of unstable angina with exacerbations of symptoms related to HF, these episodes were resolved within 3–4 days with subcutaneous LMWH, fine adjustment of diuretics, beta blockers and ACEI, and anti-angina drugs. An echocardiography follow-up 1 year later revealed EF was 45%. Creatinine clearance stabilized between 24–34 ml/minutes.

Her clinical status was stable until the end of 2010, when she was admitted again because of urosepsis. This complicated the management of HF, requiring prolonged use of a ventilator, infusion of dobutamine, complex adjustment of diuretics because her renal function was deteriorating, and the estimated creatinine clearance decreased to 11.2 ml/minute. Although glycemia control became difficult, requiring use of human isophane insulin (NPH), she was finally discharged 6 weeks later, with very deteriorated general condition and unable to perform daily activities by herself. She was admitted again 1 month later because of aspiration pneumonia with respiratory failure, further deterioration of renal function, uncontrollable heart failure, and profound septic shock in her final days. She did not survive from this clinical condition after a month of hospitalization in an intensive care unit and died at the age of 104.

3. Discussion

Management of cardiovascular disease and interventional therapy in centenarians is rarely reported. Moreover, most studies in these fields have not included a significant number of patients in this age group, with the consequence that there is a paucity of guidelines for them.

Ischemic heart disease is a leading cause of death in the elderly.¹ The diagnosis and the treatment in centenarians are challenging. This patient first developed drowsiness and days later presented to us with dyspnea. The drowsiness was interpreted by her daughter as a “weakness common to all old people,” which caused delay in medical attention. The elderly population is used to having a higher rate of atypical presentations of ACS, as symptoms are similar or confused with other chronic systemic diseases, and complaints are

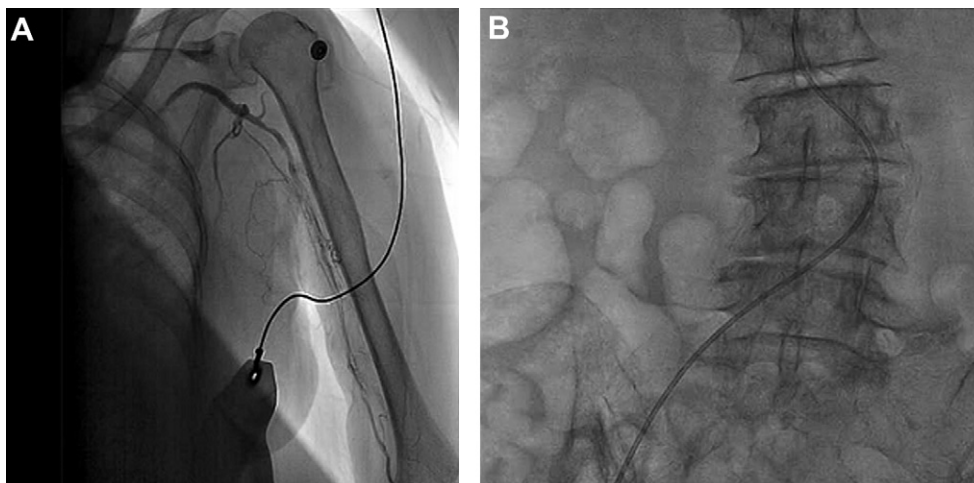


Fig. 1. (A) Severe tortuosity and atherosclerotic stenosis of brachial artery; (B) excessive tortuosity of the abdominal aorta twisting the catheter.



Fig. 2. (A) Right coronary artery with chronic total occlusion; (B) critical stenosis on middle and distal segments of the left anterior descending artery, middle segment of the left circumflex artery, and their branches.

frequently nonspecific, especially in women and those with diabetes.² One-half of these patients have dyspnea as a cardinal symptom, while others may present initially with diaphoresis, gastrointestinal symptoms, syncope, hypotension, and numbness or pain in the left arm or both arms.³ A comparison with previous ECG is essential because this helps to define the diagnosis of ACS. Recognizing electrocardiographic ischemic changes in this age group can be challenging because some studies showed that elderly patients may have less specific ECG findings than younger patients because of baseline arrhythmia, bundle branch blocks, old myocardial infarction, or pacemaker pacing rhythm.^{2,4} Serial follow-up of cardiac biochemical markers, such as CPK, CK MB and a more sensitive troponin-I, can help in increasing the accuracy of diagnosis.

This patient had low BMI (15.6), impaired renal function, anemia, and a positive stool occult blood test. The risk of bleeding was a major concern for use of the GP IIb/IIIa inhibitor, UFH or LMWH. The relative cardiovascular benefit of the GP IIb/IIIa inhibitors is not consistent in the oldest group of old patients, but common to all of GP IIb/IIIa inhibitors is the increased risk of bleeding.⁵ Patient selection, adjustment to renal function, and body weight are important to ensure the safety while using these medications.¹ However, data for age subgroups of elderly patients concerning the safety and efficacy of UFH/LMWH are lacking. If used, the dosage needs to be adjusted because of altered body composition, serum protein levels, and changes in the renal function.^{1,6}

Early coronary angiography was indicated due to the high NSTEMI/UA TIMI risk score. However, performing cardiac catheterization in the elderly can be challenging. This patient had a tortuous vascular anatomy that impeded smooth engagement of catheters to coronary arteries, and she had triple vessel disease with very complex lesions. These anatomical alterations are not uncommon in nonagenarians, and cardiac catheterization and PCI in these situations can be particularly difficult. The TACTICS-TIMI 18 trial⁷ had established the benefits of PCI for the elderly as the number needed to treat with invasive treatment to prevent one death or myocardial infarction was just nine for those more than 75 years of age, at the expense of a higher risk of major bleeding, but data for those older than 85 years old and with triple vessel disease are unknown. Furthermore, a patient's preference and will are important factors to be considered.¹ A case report on a very elderly woman (96 years of age) with ST-segment elevation myocardial infarction, and 18 months later an NSTEMI, described treatment of both events with PCI, which proved to be feasible.⁸ A multicenter

study⁹ also showed that both PCI and coronary artery bypass graft (CABG) are viable options for the revascularization on the oldest group of old patients, but the outcome is affected by left ventricular function, renal function, the acuity of the procedure, and age itself, because the risk increases exponentially for those older than 85 years of age. A study conducted by Bridges and colleagues¹⁰ concluded that operative mortality for cardiac surgery is highest for nonagenarians and centenarians; therefore, careful patient selection is needed to lower the risk of CABG. Among the risk factors for the operative mortality, the renal function and emergency/salvage surgery play important roles. In our opinion, unless there is a specific guideline for nonagenarians, the decision-making should be based on the SYNTAX score and the Euroscore to estimate the risk, and treatment as present ACS and PCI guidelines suggest, by individualizing the condition of each patient and respecting the decision of the patient.

Diagnosing HF in centenarians needs the following considerations: the reduced ability to conduct daily activities resulting from various causes may mask cardinal symptoms and signs; the existence of other systemic disease can confuse the clinician; the history taking is further complicated if patient is suffering from dementia, cognitive disorders, or sensory impairment; and presentation with nonspecific symptoms is frequent.¹¹ This patient had multiple important predisposing factors of HF: coronary artery disease, hypertension, and valvular heart disease. Later in the clinical course, HF was precipitated by ACS, renal insufficiency, and infection, which are all well-known predisposing and precipitating factors of HF. Infections can be particularly devastating, as evidenced in this case with pneumonia causing death. The clinical outcome among elderly patients is also poor if hospitalized due to HF: 30% to 50% will be rehospitalized again within 3–6 months, with a 5-year mortality of 70%.^{11–13} The goals of treatment are to improve quality of life and functional status, relieve the symptoms, prevent rehospitalization, and, ideally, prolong survival. However, the challenges while treating this patient included irregular compliance to low sodium diet due to personal habits, inability to do exercise due to osteoarthritis, and difficulty instructing her on HF-related issues due to hearing impairment. As these problems are common among nonagenarians, the management of HF on this patient included a cardiologist, nephrologist, dietitian, pharmacist, and physical therapist, with close and periodical follow-up. This kind of multidisciplinary strategy had been proven to be efficient in the management of HF,^{11,14} and it certainly worked on this patient. Physiologically, the oldest population of elderly patients have

increased vascular resistance, decreased heart rate, and less heart rate responsiveness despite increased circulating norepinephrine, decreased glomerular filtration rate, and a noncompensatory filtration fraction.¹⁵ All of these factors need to be considered and the pharmacist plays an important role in the treatment.

In conclusion, the treatment of ACS and HF in centenarians is a challenging, complex, and multidisciplinary task. Atypical presentations, physiologic differences of elderly patients, and subsequent adjustment of drug dosage, comorbidities, and predisposing and precipitating factors need to be considered. Goals of treatment include improvement of life quality, relief of symptoms, and improvement of functional status, prevention of exacerbations, and, hopefully, prolongation of survival. Until specific guidelines are established for nonagenarians, the present ACS/HF treatment guidelines should be followed, but physicians should always consider the physiologic and anatomic differences of the oldest of elderly patients.

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