

HEALTHY HEART

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Treating Coronary Artery Disease in Elderly Population

Lung Introduction

Aging is the risk factor for Coronary Artery Disease (CAD). As age increases, incidence of CAD and its related complication increases. This article highlights the changes happened in the vascular system in relation to age, incidence and prevalence; various presentations and problem related to management of acute and chronic CAD in elderly patients.

Incidence and prevalence

Cardiovascular disease is the most frequent diagnosis and the leading cause of death both in men and women above the age of 65 years.



Hypertension occurs in about one half to two third of people above 65 years of age and heart failure is the most frequent hospital discharge diagnosis in elderly population. The commonest cause of death in elderly population is cardiovascular followed by respiratory and malignancy. To understand the leading cause of death in elderly people, we need to understand pathophysiology of cardiovascular system.

Both the prevalence and severity of atherosclerotic CAD increase with age in men and women. Autopsy studies shows that more than half of people above the age of 60 have significant CAD with increasing prevalence of left main or triple-vessel CAD with older age. By using electrocardiographic evidence of Myocardial Infarction (MI), abnormal echocardiogram, carotid intimal thickness, and abnormal ankle-brachial index as a measure of

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subclinical vascular disease in community—dwelling people of age 65 above, abnormalities were detected in 22% of women and 33% of men age in the age group of 65 - 70 years and 43% of women and 45% of men in above than 80 years. By 80 years of age, the frequency of symptomatic CAD is about 20% to 30% in men and women.

Pathophysiologic changes

The Hallmark of cardiovascular aging in humans include progressive increase in systolic blood pressure, pulse wave velocity, and left ventricular mass and increase incidence of CAD and atrial fibrillation. Also, age-related decrease seen in rate of early left ventricular diastolic filling, maximal heart rate, maximal cardiac output, maximum aerobic capacity or



maximal oxygen consumption, exercise induced augmentation of ejection fraction, reflex responses of heart rate, heart rate variability, and vaso-dilatation in response to beta-adrenergic stimuli or endothelial-mediated vasodilator compounds.

Cellular enzymatic, and molecular alteration in the arterial vessel wall include migration of activated smooth muscle cells in to the intima, with increase matrix production due to altered activity of matrix metalloproteinases, angiotensin II, transforming growth factor- β , inter-cellular cell adhesion molecules, and production of collagen and collagen cross-linking. There is also loss of elastic fibers, increase in fibronectin, and calcification and decrease in endothelial cell production of nitric oxide (NO). These process lead to arterial dilatation and increase in intimal thickness, resulting in increase vascular stiffness manifested by increase in pulse wave velocity away from the heart and increased and earlier pulse wave reflections back toward the heart.

Risk Factors

The age itself is a non-modifiable risk factor for development of coronary artery disease in elderly people. Otherwise, the same risk factors that predict atherosclerosis in younger adults (lipid abnormalities, smoking, hypertension, diabetes) are predictive in older individuals as well. Modification of these risk factors is effective in reducing the risk of atherosclerosis in older patients. Therefore, preventive strategies for the elder patients include stopping smoking, blood pressure control, control of lipid abnormalities, and treatment of diabetes.

Presentations

The presentation of ischemic symptoms in elderly may be somewhat different than younger people. Anginal symptoms are more likely to be absent or ischemia may be silent in older patients compared with young patients. Symptoms are usually termed atypical because the description differs from the classical description of substernal pressure with exertion. Symptoms may primarily be dyspnea, shoulder or back pain, weakness, fatigue, or epigastric discomfort and may be precipitated by concurrent illnesses. Some elder patients describe symptoms with effort, but those with limited physical exertions (due to presence of arthritis, or pulmonary disease) may not report symptoms, and those with altered manifestations of pain due to concomitant diabetes or age related changes may also limit the accuracy of the history. Lack of symptoms during evidence of myocardial ischemia on ECG has been reported in 20% to 50 % of patients in the age group of 65 year and above.

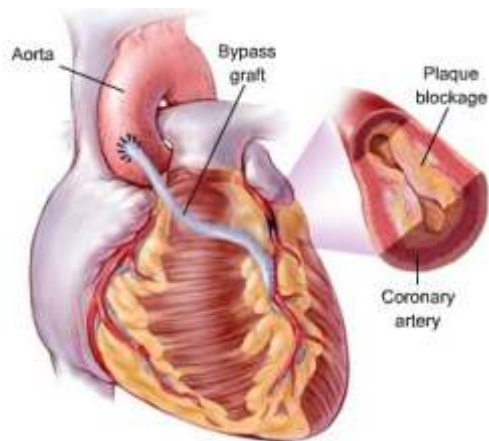
Diagnosis

Resting ECG changes can be diagnostic of rest angina or acute coronary syndrome. Diagnosis can be difficult in the group of patients with no symptoms or with limited physical activities. Treadmill exercise testing can provide prognostic information in patients able to exercise sufficiently and can also provide information about functional capacity and exercise tolerance. Echocardiography can be able to diagnose significant ischemia if regional wall motion abnormality can be identified. Asymptomatic ischemia can be further diagnosed non-invasively by dobutamine stress test. In elder patients unable to exercise, pharmacologic agents such as dipyridamole and adenosine can be used with the



nuclear scintigraphy to assess myocardial perfusion at rest and after vasodilatation; or agents such as dobutamine can be combined with echocardiography or other imaging techniques to assess ventricular function at rest and during increase myocardial demand. Screening of asymptomatic patients with CT angiography has limited role in elderly patients due to coronary calcification which may be age related.

Management



Asymptomatic CAD or Chronic stable angina

Optimal medical therapy for patients with stable coronary disease, including the elderly and diabetics with multivessel CAD, has recently been

shown to produce result equivalent to those of percutaneous coronary intervention in reducing the risk of cardiovascular events. Therapeutic goals and management goal for chronic stable angina are targeted at symptoms relief with nitrates, beta blockers, calcium antagonist, and partial fatty acid inhibitors and risk reduction and slowing the progression of disease with control of hypertension, diabetes, weight control, lipid lowering agents, exercise and smoking cessation. Aspirin at 75 to 162 mg/day is recommended. Clopidogrel, or combination of double antiplatelets drugs is recommended only in patients who underwent PCI or had ACS recently.

Dose consideration of statins is important because risk factors for statin induced myopathy include age (>80 years and in women more than men), smaller body frame, frailty, and multisystem disease. Myopathy has direct correlation with increasing dose. Myopathy may be difficult to differentiate from other types of musculoskeletal disorder or pain in the older patients, or it may not be recognized because of cognitive impairment. Complaints may also be non specific or described as flulike with fatigue nearly as common a complaint as muscle pain. In elder patients, the

smallest effective dose of a lipid lowering agent should be used and sign and symptoms should be monitored.

Acute coronary syndrome

Treatment decisions are often considered separately for ST elevation and non-ST elevation or unstable angina. NSTEMI and unstable angina can be managed initially with aggressive medical treatment and intervention if remain symptomatic despite aggressive medical treatment. For STEMI, patients up to the age of 75 years, the most trial, show that fibrinolytic, antiplatelet, and antithrombin therapy is associated with survival advantage compared with placebo that may be similar to or less than seen in younger patients. Bleeding and transfusion rates are higher in the elderly patients, especially with improper dosing of antiplatelet and anti thrombotic agents. Those who are at high risk for intracerebral hemorrhage include patients above the age of 75 years, women, African Americans, smaller patients (<65 kg for women and <80kg for men), and those with prior stroke or systolic blood pressure >160 mm Hg. Fibrin specific agents are also associated with increased stroke risk due to intracerebral hemorrhage in for those between 75 to 80 years. Co administered low molecular weight or unfractionated heparin at excess doses contributes to the excess bleeding. Dosage adjustments for weight and estimated renal clearance may decrease but not eliminate risk of bleeding in very old patients and in women. Cardiac rupture risk with thrombolysis is also increased in patients above 70 years and in women (0.5% to 2%) and does not appear to be related to the intensity of anticoagulation. Risks of reperfusion in patients above 85 years appear to differ from those in younger patients, supporting individualized clinical decisions.

Post MI or post interventional patients

Administration of aspirin, beta blockers, ACE inhibitors, or ARBs in patients with left ventricular dysfunction and lipid-lowering drugs for the post-MI patient is based on clinical trial data showing benefit in populations that have included elderly patients. With the caveat of adjustment of dosing for age and renal status, recommendations are the same as in younger patients. The addition of clopidogrel to aspirin after non-ST elevation MI has similar benefits in patients younger and older than 65 years, without



significant data on patients above the age of 75. The prevalence of depression in patients after MI or revascularization is estimated at 20% to 30% for major depression. Studies show associations between depression and low perceived social support and increased cardiac morbidity and mortality in post-MI patients and in patients undergoing CABG.

Revascularization in elderly

Revascularization procedures in the elderly are increasing, with greater increases in the numbers of percutaneous coronary intervention (PCI) procedures than in coronary artery bypass grafting (CABG). At least half of PCI procedures and CABG are performed in patients above 65 years, with one third in patients above 70 years. In randomized trials, patients aged 65 to 80 years have been reported to have higher early morbidity and mortality after CABG compared with PCI but greater angina relief and fewer repeated procedures after CABG. Stroke is more common after CABG than after PCI (1.7% versus 0.2%), and heart failure and pulmonary edema are more common after PCI (4.0% versus 1.3%). Five-year survival rates are above 80% for both procedures, but there is considerable selection bias in patients undergoing these procedures; women and minorities are underrepresented, and those at lowest and intermediate risk undergo the bulk of procedures.

Early CABG mortality increases from below 2% in patients younger than 60 years to between 5% and 8% in patients elder than 75 years, approaching 10% in patients above the age of 80. Elderly women are at highest risk, in part because of co-morbid conditions. For patients above the age of 90, operative mortality has been reported as 11.8% in the Society of Thoracic Surgeons database.

Pharmacotherapy for CAD in elderly

On an average, body size decreases with aging and body composition changes, resulting in decreased total body water, intravascular volume, and muscle mass. Age-related changes are continuous but most pronounced between 75 to 80 years. Women, with the exception of African American women, tend to weigh less and to have smaller body and intravascular volumes and muscle mass than do men at all ages. When fibrinolytic drugs have been administered without weight-based dosage adjustments,

increased risk of intracranial hemorrhage results in elderly patients age, smaller body weight, and female sex (in addition to hypertension and prior cerebrovascular disease). Bleeding with low-molecular-weight heparins in combination with other lytic agents can be reduced by use of weight-based dosing. Routine dosage adjustments for weight should be made in loading doses of medications, especially those with a narrow therapeutic index.

Risk of bleeding is higher in elderly patients with use of thrombolytics, antithrombotics and antiplatelets therapy compared to younger patients. High dose of statin may be associated with myopathy. Marked vasodilatation due to rapid absorption or higher peak effects of nitrates can exacerbate postural hypotension. Non lipophilic beta blockers (atenolol, nadolol) may produce fewer central nervous system effects. Calcium channel blockers, especially the dihydropyridines can produce pedal edema more frequently in older patients. Verapamil can exacerbate constipation, especially in inactive elderly. Both beta blockers and nondihydropyridines calcium channel blockers should be avoided in the presence of sick sinus syndrome disease. Hormone replacement therapy is not indicated for either primary prevention of coronary heart disease or treatment of coronary artery disease. Adverse effects of dizziness, constipation, nausea, asthenia, headache, dyspepsia, and abdominal pain with the piperazine derivative ranolazine are more common in elderly patients, and women may have less exercise benefits with ranolazine compared with men.

Structural Heart Diseases in Elderly

Structural heart disease is common in the elderly, and definitive treatment of many structural heart diseases requires cardiac surgery. Because surgical morbidity and mortality increase with age, many elderly patients are at high surgical risk or inoperable. The last decade has seen an explosion in effective transcatheter treatments for many structural heart diseases, including TAVI for aortic stenosis, TMVR for mitral valve disease and left atrial appendage occlusion for atrial fibrillation. As a result, many elderly patients now have access to effective treatments for structural heart disease with a considerably lower periprocedural risk.



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