

CHRONIC CORONARY ARTERY DISEASE IN OLDER ADULTS

Chronic Coronary Artery Disease Case: “Shortness of breath in an 85 year old”

A retired 85-year-old laborer, Mr. W, comes to clinic at the request of his wife. He had always been moderately active doing odd jobs around the house and walking 10-30 minutes/day with his wife. However, over the past 6 months, she has noticed he becomes short of breath while walking and fatigues easily. He is unable to keep up with his wife these days and recently, he has preferred to sit out the daily walks. He notes that he gets more short of breath even when he walks to the mailbox. He has not had chest discomfort. He takes an aspirin daily as well as “a pill for high blood pressure”. He is occasionally forgetful, but is able to do all activities of daily living. He smoked 1-2 packs/day for over 40 years, but quit last year. His past history is remarkable only for osteoarthritis and mild COPD.

On exam, his BP is 162/60 mm Hg sitting; repeated 156/68 mm Hg. Pulse: 64 bpm. HEENT: Mild AV-nicking on ophthalmologic exam. No carotid, abdominal, or femoral bruits, slightly diminished dorsalis pedal and posterior tibial pulses. Lungs: clear; cardiac: slightly diffuse and laterally displaced point of maximal impulse; normal S₁, S₂, no murmurs, + S₄. Abdomen: benign, extremities: no edema, 2+ peripheral pulses, non-focal neurological exam. EKG reveals sinus rhythm at 68 beats a minute, LVH with strain, and anterior Q waves consistent with a prior myocardial infarction.

What is your suspicion of coronary artery disease in this case?

Chronic ischemic heart disease may be challenging to diagnose in older adults due to the higher prevalence of non-cardiac conditions and lower exercise tolerance. A number of possible explanations for dyspnea on exertion and fatigue should be considered in this patient. While an atypical presentation of chronic, stable coronary artery disease should be considered, his history of tobacco use introduces obstructive lung disease as a possibility. Anemia, heart failure, atrial fibrillation, and deconditioning also should be considered. All of these conditions may coexist in this patient making diagnosis of a single cause elusive. Nevertheless, the *change* in symptom pattern and decrease in exercise tolerance confirm a change in his condition. Diagnostic testing is warranted, and should include an assessment of LV function and stress imaging given his old anterior infarct on EKG (suggesting prior unrecognized CAD).

The spectrum of chronic ischemic heart disease includes patients who have asymptomatic ischemia, stable angina pectoris, unstable angina, or prior MI. The prevalence of CHD increases with age in men and women, as does the prevalence of unrecognized or “silent” myocardial infarction. Unrecognized myocardial infarction also increases with age, especially among older women. Older persons with clinically unrecognized MI have a similar or higher incidence of new coronary events and mortality compared with those with recognized MI. Subclinical disease markers such as EKG evidence of prior MI, abnormal ankle-brachial indices, increased left ventricular mass, depressed LV function, and increased carotid intimal thickness predict subsequent cardiovascular events and are useful screens for CVD in the elderly. In the Cardiovascular Health Study (CHS), an epidemiologic investigation of over 5,000 community-dwelling adults aged ≥65 years, the prevalence of subclinical disease increased from 22% in women 65-70 years of age to 43% in women over age 85. In men, the prevalence of subclinical disease increased from 33% in those aged 65-70 years of age to 45% in those over age 85. In addition, aging physiology, specifically vascular stiffness and age-associated endothelial

dysfunction may contribute to the development and progression of CAD, and compensatory LV hypertrophy due to increased afterload and age-associated diastolic dysfunction. All of these factors potentiate the risk for ischemia by altering the O₂ supply and demand relationship in the older individual.

Case continued

Mr. W has evidence of a prior “silent MI” with anterior Q waves along with LVH and repolarization abnormality on his EKG. An echocardiogram confirms a hypocontractile anterior wall, along with LVH and an ejection fraction of 45%. There is trivial aortic sclerosis and mild mitral regurgitation. On further chart review, he had a lipid panel obtained 3 months ago which showed an LDL-c of 125 mg/dL, an HDL-c of 43 mg/dL, and triglycerides of 69 mg/dL.

He is taking aspirin 81 mg QD and metoprolol 25 mg. You determine there is ample room for medication adjustment as the first step.

What therapies would you add for cardiovascular prevention?

The guidelines for pharmacologic treatment of CHD are similar in older and younger patients, however safety concerns may be higher with age and comorbidity. Mr. W is already taking aspirin and a beta blocker, however his blood pressure is not well controlled. Hypertension is a well known risk factor for coronary artery disease. Data from the Prospective Studies Collaboration demonstrate the increased rate of coronary disease among hypertensive patients regardless of age. Likewise, mortality from ischemic heart disease increases in all age groups as systolic and diastolic blood pressure increase. Therefore, further lowering of blood pressure to a systolic goal of less than 140 mmHg is advisable. Either initiating an ACE inhibitor or increasing the dose of the beta-blocker would be reasonable.

The Antiplatelet Trialists' Collaboration documented aspirin's benefit in over 14,000 older CHD patients enrolled in randomized trials for reducing future risk of death, recurrent MI, and stroke ($p < 0.00001$). The absolute benefit was greater in patients over age 65 than in younger patients. The CURE trial further found that low-dose aspirin (75-100 mg) was preferable to doses of 160-325 mg/day, whether combined with clopidogrel or not, with a lower risk of bleeding and similar efficacy. Thus, in older individuals, aspirin dose should remain low to limit risk of bleeding.

Conduction system disease and sinus node dysfunction are more prevalent in the elderly, leading to increased risks of heart block and bradyarrhythmias with beta-blocking or non-dihydropyridine calcium channel blocking agents. Patients over age 75 were not enrolled in most of the beta-blocker post-MI trials. However, observational analyses have demonstrated relative risk (RR) reductions in elderly patients similar to those seen in clinical trials. These benefits remain even when accounting for comorbidities. In elderly patients with heart failure and ischemic disease, carvedilol and metoprolol provide additional benefits when added to ACE inhibitors, and in elderly patients with decreased renal function these agents may also be preferable. ACE inhibitors improve outcomes in older patients with CAD, even in the absence of heart failure or LV systolic dysfunction. In HOPE, Ramipril 10 mg daily lowered the risk for cardiac death, MI, or stroke by 25% during 4.5 years of follow-up compared with placebo. Age subgroup analysis again demonstrated that those age ≥ 70 years had a greater risk reduction than younger patients. Hypotension and dizziness may also occur more frequently and renal function should be monitored closely in older adults receiving an ACE inhibitor.

Finally, his LDL-C should also be lowered to below 100mg/dL with an HMG CoA Reductase inhibitor. HMG CoA reductase inhibitors have been associated with greater absolute risk reductions in older CVD patients (65-75 years of age) compared to younger patients. HPS confirmed the benefit of statin therapy in high-risk vascular disease patients regardless of age. The PROSPER study exclusively enrolled patients over age 70 with high-risk vascular disease and also found that pravastatin reduced the risk of coronary disease. A recent meta-analysis of 9 randomized secondary prevention trials confirmed an even greater magnitude of benefit for statin therapy on all-cause mortality in older adults than previously reported using pooled data (19,569 patients 65–82 years). Statins were associated with a RRR for all-cause mortality of 22% (0.78, 95% confidence interval [CI] 0.65–0.89); the calculated NNT over 5 years to save 1 life was 28. There were similar RRRs for coronary heart disease mortality (RRR=30%, NNT=34), nonfatal MI (RRR=26%, NNT=38), the need for revascularization (RRR=30%, NNT=24), and stroke (RRR=25%, NNT=58, 95% CI 27–177). There was increasing benefit with increasing age—and a RRR for those over age 80 upwards of 50%. The National Cholesterol Education Program (NCEP) guidelines recommend that elderly patients receive lipid management similar to younger patients, *unless* life expectancy is less than two years. Muscle side effects have been associated with statin dose and/or coadministration with drugs metabolized by the cytochrome P-450 system (ie, drug-drug interactions), but not with achieved LDL-C or patient age. In 2002, the American College of Cardiology (ACC)/AHA/National Heart, Lung, and Blood Institute (NHLBI) Clinical Advisory on the Use and Safety of Statins stated, “As a rule, statin therapy should be employed more cautiously in older persons, particularly older thin or frail women, but it is not contraindicated in these or other high-risk patients.” Therefore, although consideration of duration of therapy, benefits, and side effects is warranted, the vast majority of older adults benefit from secondary prevention and high risk primary prevention for CHD.

Case continued

Mr. W was started on good medical management. He has been compliant with pravastatin 20mg nightly, metoprolol 50 mg daily, lisinopril 5mg daily, and aspirin. He returns to your office for follow up and complains of fatigue when walking to the mailbox. On exam, his BP is 128/55 mm Hg sitting, pulse 55 bpm.

You obtain stress echocardiography during which he exercises for 3 minutes stopping for chest pain. Rate pressure product was 15,200. He developed 2 mm horizontal, downsloping ST segment depressions which resolve 8 minutes in recovery. Echocardiographic imaging demonstrated mid anterior, inferior and apical hypokinesis with exercise. Left ventricular ejection fraction was estimated to be 40%.

What would you do next for Mr. W?

Revascularization for chronic CAD should be considered for those at high risk based on non-invasive testing or with continued anginal symptoms despite medication. Mr. W has a high risk stress test with ischemia involving the anterior and inferior walls with impaired left ventricular function. This ischemia occurs at a low workload and he is symptomatic despite medical therapy. He has near normal renal function. Cardiac catheterization should be recommended, however this should be determined after discussing the risks, benefits, and downstream implications of catheterization and revascularization with the patient, who may or may not agree to proceed. While improving the medical regimen may improve his symptoms, the testing suggests annual mortality exceeds 3%. His findings are compatible with multivessel coronary disease and if the anatomy is suitable, the patient should receive revascularization. While the

addition of a nitrate is a reasonable choice, it alone is unlikely to control his symptoms. [Of note: as stressed in recent guidelines, the decision to pursue cardiac catheterization should be pursued only after explaining the potential risks and benefits of the diagnostic procedure as well as the potential downstream therapeutic options (e.g., coronary revascularization) and eliciting treatment preferences. Since this patient has been functional with few limitations prior to his worsening symptoms, he faces low risk with revascularization and stands to benefit in terms of symptom relief. The benefits of catheterization would outweigh the risks.

Case continued

Angiography reveals 70% left main coronary stenosis, an 80% proximal LAD lesion involving a large diagonal branch, a 70% stenosis in a large OM branch of the left circumflex artery, and an 80% mid vessel RCA stenosis. Ejection fraction is 40%.

What should be done next?

While procedural risks rise with age, both percutaneous and surgical revascularization can be pursued in older adults with consideration of the individual benefit and risk. The type and severity of coronary stenosis, LV function, clinical symptoms, comorbidities, as well as preferences must be considered in making patient-centered decisions. Revascularization is preferred over medical therapy among patients with three vessel coronary artery disease and reduced LV function if the risk of procedural complications and technical considerations are not prohibitive. This patient has severe coronary stenoses affecting a large amount of myocardium, and an already reduced EF. In addition, he has progressing symptoms with less room for additional medication adjustment. Based on the substantial amount of myocardium at risk and the severity and diffuse nature of the disease, the risk of death or MI is substantial. This must be placed in the perspective of competing risks. He has preserved executive function and has been fairly healthy, making him as apparently fit as most 85 year olds. A return to full physical function would be more certain with bypass surgery, despite the near term challenges of recovery and potential complications.

The risk of in-hospital mortality with PCI and CABG increases with age. Despite higher short-term risks of procedures among older patients, with rare exception (primary PCI for cardiogenic shock in patients greater than 75 years of age), separate categories for indications have not been created for the older patients in the ACC/AHA Guidelines for PCI or CABG. Decisions regarding revascularization should also take into account special circumstances found in this group including the higher prevalence of renal failure, cognitive impairment, reduced left ventricular function, peripheral arterial disease, stroke, and atrial fibrillation.

The TIME trial showed a greater freedom from subsequent adverse cardiac events with revascularization over optimal medical therapy (at least two antianginals) in symptomatic older adults. Medical therapy without revascularization however may still be indicated for older patients who are deemed at prohibitive risk for CABG or PCI due to anatomic factors or comorbid issues such as CNS disease cognitive impairment. CABG can be performed safely among older patients affording protection from ischemic complications in relation to longer term outcomes. For PCI, procedural success and restenosis rates in octogenarians are similar to nonoctogenarians, but older patients have higher rates of vascular complications, in hospital and late mortality compared with younger patients. Whether the benefit of PCI is greater than

CABG in the long-term for older patients is controversial and various factors must be considered when selecting the appropriate strategy.

Issues influencing a patient's successful return to prior level of functioning following CABG include cognitive impairment, renal insufficiency, severe aortic calcification (increasing risk of stroke during cross clamping), limited inability to participate in rehabilitation after surgery, absence of vein conduit and other technical considerations. Issues increasing the risk of complications include older age, female gender, recent MI (within 30 days), higher NYHA class, reduced LVEF (especially < 20%), prior CABG, mitral valve disease, comorbidities, and urgent surgery. PCI may be performed if the patient is a poor surgical candidate yet requires revascularization. The lesions must be amenable to PCI and the risks of the procedure including bleeding, renal failure, stroke and myocardial infarction must be considered. Nonetheless, appropriately selected elderly patients may derive substantial benefits from revascularization procedures, particularly with respect to controlling symptoms and improving quality of life, so that age alone should not be considered a contraindication to either PCI or CABG.

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