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Coronary Artery Disease: Revascularization (Learner's Guide)

I. Objectives

- To review the evidence on whether percutaneous coronary intervention (PCI) offers any additional benefit to optimal medical therapy in stable coronary artery disease (CAD)
- To compare the efficacy of PCI versus coronary artery bypass grafting (CABG) in patients with multivessel disease
- To review the accepted indications for CABG in stable CAD

II. Case 1

A 58-year-old man with a history of type II diabetes, hyperlipidemia and a myocardial infarction 3 years ago presents to the emergency room for chest pain at rest lasting 20 minutes. On admission, his pulse is 97 bpm and BP = 157/63 mm Hg, and his exam is otherwise unremarkable. An EKG shows diffuse nonspecific ST/T wave changes. His chest radiograph is normal. The patient is admitted to the hospital, and he rules out for acute coronary syndrome (ACS) with negative serial cardiac enzymes. He is started on an aspirin, beta-blocker and nitroglycerin paste, and he remains free of chest pain. On an exercise treadmill test done the following morning, he develops 1 mm horizontal ST depressions. The patient achieves 7 METS before he has to stop because of fatigue.

Should this patient be referred for a coronary angiogram to evaluate for revascularization?¹

When should patients generally be evaluated for possible revascularization?¹

II. Case 2

A 61-year-old woman with hypertension and hyperlipidemia is seen in general medicine clinic. She complains of intermittent, stabbing chest pains unrelated to exertion for the past two months. She is currently taking metoprolol, enalapril, simvastatin and aspirin. Her exam is normal. Her baseline EKG shows left ventricular hypertrophy with strain, which is unchanged from a prior EKG. She undergoes a treadmill Sestamibi and stops at 4 METS because of chest pain. The nuclear medicine portion of the exam reveals two large areas of ischemia in the anterolateral and inferior walls. She is referred to the cardiologist, who performs a cardiac catheterization. The angiogram reveals a 90% proximal left anterior descending (LAD) stenosis, an 80% proximal left circumflex stenosis and an 80% mid-right coronary artery (RCA) stenosis. Her left ventricular ejection fraction is 50%.

Should this patient undergo revascularization? If so, should she undergo PCI or CABG?^{1,2}

If this patient had type 2 diabetes, would that influence your decision about whether she should undergo PCI or CABG?^{3,4}

If this patient had an ejection fraction of only 30%, would that influence your decision on whether she should be revascularized? If so, should she undergo PCI or CABG?^{5,7}

III. Questions for Further Discussion

Should fractional flow reserve be measured to determine the appropriateness of revascularization with PCI?⁶

IV. Key Articles

1. Boden W, *et al.* for the COURAGE Trial Research Group. Optimal medical therapy with or without PCI for stable coronary artery disease. *N Engl J Med* 2007; 356: 1503-16. [FULL TEXT](#) [PDF](#)
2. Serruys P, *et al.* for the SYNTAX Investigators. Percutaneous coronary intervention versus coronary-artery bypass grafting for severe coronary artery disease. *N Engl J Med* 2009; 360: 961-72. [FULL TEXT](#) [PDF](#)
3. Farkouh M, *et al.* for the FREEDOM Trial Investigators. Strategies for multivessel revascularization in patients with diabetes. *N Engl J Med* 2012; 367: 2375-84. [ABSTRACT](#)

V. Reference Articles

4. Hlatky M, *et al.* Coronary artery bypass surgery compared with percutaneous coronary interventions for multivessel disease: a collaborative analysis of individual patient data from ten randomised trials. *Lancet* 2009; 373: 1190-7. [ABSTRACT](#)
5. Velazquez E, *et al.* for the STICH Investigators. Coronary-artery bypass surgery in patients with left ventricular dysfunction. *N Engl J Med* 2011; 364: 1607-16. [FULL TEXT](#) [PDF](#)
6. DeBruyne B, *et al.* Fractional flow reserve-guided PCI versus medical therapy in stable coronary artery disease. *N Engl J Med* 2012; 367: 991-1001. [ABSTRACT](#)

VI. Resources

7. Patel M, *et al.* ACCF/SCAI/STS/AATS/AHA/ASNC/HFSA/SCCT 2012 Appropriate Use Criteria for Coronary Revascularization Focused Update. *J Am Coll Cardiol* 2012; 59: 857-81. [FULL TEXT](#) [PDF](#)