

Screening for Asymptomatic Coronary Artery Disease: When, How, and Why?

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Definition

The presence of objective evidence of myocardial ischemic in the absence of chest discomfort or other anginal equivalents

Introduction

- It is the most common manifestation of coronary heart disease
- Greater than 75% of ischemic episodes are silent
- Patients with diabetes, older age, prior MI, or surgical revascularization are particularly susceptible

Deedwania, Arch Intern Med 1991 151:2373

Symptomatic Patients

- 15-20% of patients with prior MI have silent ischemia
- 30-40% of patients with unstable angina have silent ischemia despite aggressive medical treatment

Gottlieb, JAMA 1988 259:1030

ACIP Study

- The Asymptomatic Cardiac Ischemia Pilot study showed:
 - 1) Intensive antianginal drug therapy aimed at symptom control does not eliminate silent ischemic episodes
 - 2) Patients with silent ischemia on Holter monitoring have more advanced and multivessel CAD

Sharaf, Williams, Miele, J Am Coll Cardiol 1997; 29:78

Mechanisms

- Inability to reach pain threshold
- Presence of higher pain threshold
- Higher beta-endorphin levels
- Defective anginal warning system
- Higher production of anti-inflammatory cytokines

Mazzone, J Am Coll Cardiol 2001; 38:1895

Pathophysiology

- Most episodes are preceded by an increase in oxygen demand
- Only 20-30% are due to reduced coronary flow
- There is a circadian pattern to the episodes
 - This has definite therapeutic implications

Deedwania, Circulation 1993; 88:328

Screening

- The rationale for identifying patients with silent ischemia is the association with an increase in coronary risk that may be reversible with appropriate therapy
 - SCD is the initial manifestation in 18% of events
 - ½ SCDs occur without a prior history of CAD

Ekelund, J Am Coll Cardiol 1989; 14:556

Groups

- People with jobs linked to public safety or that require high CV performance
- Men over 40, women over 50, and others with multiple cardiac risk factors prior to vigorous exercise programs
- Patients with diabetes

Diagnostic Approach

There is no diagnostic test which is ideal due to the low pretest likelihood of the disease and that the predictive accuracy of any screening test is low

Juneja, Wasir. Int J Cardiol, 1994; 43:1

Diagnostic Approach

- ETT and Holter monitoring
- Exercise echo and perfusion imaging to increase sensitivity and specificity
 - Women, abnormal ECG
- Pharmacological stress tests in those that cannot exercise
 - Dobutamine, adenosine, dipyridamole

Diagnostic Approach

- Coronary artery calcification by CT
 - Highly sensitive and specific
 - Concern over radiation dose
 - ? whether results translate into patients having silent ischemia
- Cardiac CT angiography
 - Negative predictive value greater than 90%
 - Intermediate risk patients after initial testing
- Coronary angiography not recommended

Prognosis

- MRFIT trial found a significant association between exercise induced silent ischemia and mortality
 - Men with exercise induced silent ischemia had a relative risk of 3.4 for cardiac death c/w men without ischemia
- Exercise induced silent ischemia is associated with an increase in mortality and event rate
 - Smoker 5.9 and 3.0x, hyperchol 3.8 and 1.9x, HTN 4.7 and 2.2x

Laukkanen JA. J Am Coll Cardiol 2001;38:72

Prognosis

Heart and Soul Study

- Stress echo in patients with stable CHD
 - 24% ischemia, 17% angina
- Ischemia rather than angina predicts outcome
- 1° outcome of MI or CHD death more often in patients with ischemia
 - 21% verses 8% without ischemia
 - Angina did not significantly affect outcome

Gehi, AK. The Heart and Soul Study. Arch. Intern. Med 2008 168:1423

Prognosis

- Silent ischemia after an episode of unstable angina has been associated with an adverse clinical outcome
- Silent ischemia within a few weeks post MI detected by Holter monitoring is associated with a 2-4x cardiac event rate compared with those without ischemia

Treatment

Medications

- **β blockers**
 - Most effective, used as first line therapy
 - Only med that appears to reduce adverse outcome
 - Evaluate efficacy by repeat Holter testing and titrating dose until ischemia suppressed by $\geq 50\%$ or max tolerated dose reached

Pepine, CJ. The Atenolol Silent Ischemia Study. Circulation 1994; 90:762

Treatment

- Calcium channel blockers
 - Effective when silent ischemia occurs without an increase in heart rate
 - Amlodipine, diltiazem, LA nifedipine

Deedwonia, PC. Am J Cardiol 1997;80:421

- Combo Therapy
 - β blockers, calcium channel blockers, nitrates
 - When β blocker not effective, dose related side effects, contraindication to β blocker
- Statins

Treatment

Revascularization

- There is limited data evaluating the efficacy of coronary revascularization in the treatment of silent ischemia
- Available data suggest that revascularization may improve patient outcomes

Treatment Approach

1. Patients with mild ischemia can be continued on medical therapy alone, but patient selection is important
2. Coronary angiography followed by PCI or CABG is performed for patients with noninvasive evidence of moderate to large regions of myocardium at risk

2005 ACC/AHA guideline update JACC 2006

Conclusion

- Silent ischemia is associated with adverse clinical outcomes
- Screening in high risk patients and diabetics
- Diagnosis is made by stress testing and Holter monitoring
- Aggressive medical therapy is the mainstay of treatment