Improving Outcomes in Patients with Stable Ischemic Heart Disease

Cardiology Updates
April 30, 2013
Anaheim, California

Faculty:
Robert A. Kloner, MD, PhD
Karol E. Watson, MD, PhD
Session 2: Improving Outcomes in Patients with Stable Ischemic Heart Disease

Learning Objectives

1. Describe the importance of incorporating guideline-directed medical therapy (GDMT) in all stable IHD patients, achieving goals in treating cardiovascular risk factors, and preventing major adverse cardiovascular outcomes in patients with stable IHD.

2. Elaborate appropriate use of revascularization in stable IHD patients, based on outcome trials and guidelines.

3. Describe mechanisms of action, hemodynamic profiles, and clinical data associated with antianginal therapies.

Faculty

Robert A. Kloner, MD, PhD
Director of Research
Heart Institute
Good Samaritan Hospital
Professor of Medicine
University of Southern California
Los Angeles, California

Robert A. Kloner, MD, PhD, is professor of medicine, cardiovascular division, Keck School of Medicine, at the University of Southern California, and director of research of the Heart Institute of Good Samaritan Hospital, both in Los Angeles. Dr Kloner received his MD and PhD from Northwestern University Medical School in Chicago and served his residency at Peter Bent Brigham Hospital in Boston, Massachusetts. Additional training included clinical and research fellowships at Harvard Medical School and Brigham and Women's Hospital. As an associate professor of medicine at Harvard Medical School, he received an Established Investigator Award from the American Heart Association. Dr Kloner has made major contributions to the understanding of such concepts as no-reflow phenomenon, stunned myocardium, limitation of myocardial infarct size, post-reperfusion apoptosis, reperfusion phenomena and triggers of cardiovascular events. Other major research interests include cardiac cell transplantation, the effect of toxins on the heart, preventative cardiology, hypertension, and PDE5 inhibition. Dr Kloner has written extensively in peer-reviewed journals and medical texts, including: Cardiovascular Trials Reviews, the Guide to Cardiology, Stunned Myocardium, Ischemic Preconditioning, and Heart Disease and Erectile Dysfunction. Dr Kloner serves as editor-in-chief of the Journal of Cardiovascular Pharmacology and Therapeutics. He serves as guest editor of Circulation. He is on the editorial boards of the American Journal of Cardiology, Heart, Basic Research in Cardiology, International Journal of Impotence Research, Regenerative Medicine, and Congestive Heart Failure.

Karol E. Watson, MD, PhD
Associate Professor of Medicine
Director, University of California, Los Angeles (UCLA)
Fellowship Program in Cardiovascular Diseases
UCLA School of Medicine
Los Angeles, California

Karol E. Watson, MD, PhD, is associate professor of medicine in the University of California, Los Angeles (UCLA)’s division of cardiology and director of the UCLA Fellowship Program in Cardiovascular Diseases. Dr Watson received her undergraduate degree from Stanford University, her medical degree from Harvard Medical School, magna cum laude, and her PhD in
physiology from UCLA. She completed a residency in internal medicine and a fellowship in cardiology at UCLA, and continued there as part of the UCLA Specialty Training and Academic Research program and as chief fellow in cardiovascular diseases. Currently, Dr Watson is director of the Women's Cardiovascular Center at UCLA, co-director of the UCLA Program in Preventative Cardiology, and director for the Center for Cholesterol and Hypertension Management. Dr Watson is a principal investigator for several large National Institutes of Health (NIH) studies, and serves on NIH Data, Safety, and Monitoring Boards and Steering Committees. She is a member of the National Cholesterol Education Program; is vice president for the Association of Black Cardiologists; and served as chairperson of the scientific advisory board for Womenheart, the national organization for women living with heart disease. Dr Watson chairs the Cholesterol Committee of the Association of Black Cardiologists, and serves on the NIH Expert Panel for the Integrated Clinical Guideline for Cardiovascular Risk Reduction. She is a member of the Food and Drug Administration Clinical Chemistry and Clinical Toxicology Devices Panel. Dr Watson’s more than 80 publications and presentations have addressed many subjects including prevention of heart disease, vascular calcification, hormone replacement therapy, the metabolic syndrome, hypertension, hypercholesterolemia, and cardiovascular disease in African Americans.

Faculty Financial Disclosure Statements
The presenting faculty reports the following:

Dr Kloner has received honoraria from Amarin, AstraZeneca, Gilead, and Pfizer.

Dr Watson is a consultant for and has received honoraria from Aegerion.

Education Partner Financial Disclosure Statement
The content collaborator at Voxmedia reports the following:

John F. Kocsis, PhD, has no financial relationships to disclose.

Suggested Reading List


SESSION 2
10:15 AM – 11:45 AM

Improving Outcomes in Patients with Stable Ischemic Heart Disease

SPEAKERS
Robert A. Kloner, MD, PhD
Karol E. Watson, MD, PhD

Drug List

<table>
<thead>
<tr>
<th>Generic</th>
<th>Trade</th>
<th>Investigational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amlodipine</td>
<td>Norvasc</td>
<td></td>
</tr>
<tr>
<td>Alprostadil</td>
<td>Tenormin</td>
<td></td>
</tr>
<tr>
<td>Atorvastatin</td>
<td>Lipitor</td>
<td></td>
</tr>
<tr>
<td>Carvedilol</td>
<td>Coreg</td>
<td></td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>Plaxa</td>
<td></td>
</tr>
<tr>
<td>Diltiazem</td>
<td>Cardizem</td>
<td></td>
</tr>
<tr>
<td>Enalapril</td>
<td>Vasotec</td>
<td></td>
</tr>
<tr>
<td>Lisinopril</td>
<td>Zestril, Prinivil</td>
<td></td>
</tr>
<tr>
<td>Metoprolol (long-acting)</td>
<td>Toprol XL</td>
<td></td>
</tr>
<tr>
<td>Nadolol</td>
<td>Corgard</td>
<td></td>
</tr>
<tr>
<td>Nifedipine</td>
<td>Adalat, Procardia</td>
<td></td>
</tr>
<tr>
<td>Propranolol</td>
<td>Inderal</td>
<td></td>
</tr>
<tr>
<td>Ranolazine</td>
<td>Ranexa</td>
<td></td>
</tr>
</tbody>
</table>

Learning Objectives

- Describe the importance of incorporating guideline-directed medical therapy (GDMT) in all stable IHD patients, achieving goals in treating cardiovascular risk factors, and preventing major adverse cardiovascular outcomes in patients with stable IHD
- Elaborate appropriate use of revascularization in stable IHD patients, based on outcome trials and guidelines.
- Describe mechanisms of action, hemodynamic profiles, and clinical data associated with antianginal therapies.

Outcomes Question #1

What is your overall confidence in prescribing current guideline-directed lifestyle interventions and pharmacologic medications, and in treating to guideline-directed risk factor goals, for patients with stable ischemic heart disease?

1) Not at all confident
2) 3) 4) 5) 6) 7) Completely confident
### Outcomes Question # 2

According to the 2011 ACCF/AHA/SCAI PCI guidelines, which of the following research findings regarding PCI compared to medical therapy is/are TRUE?

1) PCI reduces the incidence of angina
2) PCI may increase the short-term risk of MI
3) PCI has not been shown to improve survival in stable patients
4) PCI does not lower the long-term risk of MI
5) All of the above
6) 1 and 3 only

### Outcomes Question # 3

What is your overall confidence of the similarities and differences in mechanisms of action and hemodynamic profiles of antianginal therapies?

1) Not at all confident
2)
3)
4)
5)
6)
7) Completely confident

### Stable Ischemic Heart Disease:

### Risk Factor Control

### Prevention of MI and Death

### When to Revascularize

Karol E. Watson, MD, PhD, FACC
Co-director, Program in Preventive Cardiology
UCLA School of Medicine

### Potential Therapies for Atherosclerosis

- Folate
- Nitrates
- Olive Oil
- Calcium Channel Blockers
- Red Wine
- Anti-Oxidants
- Calcium
- Channel
- Blockers
- Stents
- Estrogen
- Niacin
- Fibrates
- Garlic
- Liver
- Lasers
- Fiber
- ACE Inhibitors
- Weight Loss
- Vitamin E
- Oat Bran
- Platelet antagonists
- Soy Beans
- Resins
- Biofeedback
- Vegetables
- Gene Therapy
- Diet

### Burden of Atherosclerotic Vascular Disease: CAD, CVD, PVD

- Prevalence—25 million in United States
- Annual rates
  - Myocardial infarction—1.2 million
  - Strokes—795,000
  - CVD Mortality—814,000 (every 30 seconds a death)
  - Cardiac catheterization—1.1 million
  - Percutaneous revascularization—622,00
  - Surgical revascularization—232,000
- Annual direct cost—$280 billion


### 2012 ACCF/AHA/ACP/AATS/PCNA/SCAI/STS Guideline for the Diagnosis and Management of Patients With Stable Ischemic Heart Disease

Developed in Partnership with American College of Cardiology Foundation, American Heart Association, American College of Physicians, American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons.
Classification of Recommendations and Levels of Evidence

<table>
<thead>
<tr>
<th>Class I</th>
<th>Class IIa</th>
<th>Class IIb</th>
<th>Class III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit &gt;&gt; Risk</td>
<td>Benefit &gt;&gt; Risk Additional</td>
<td>Benefit ≥ Risk Additional</td>
<td>Risk ≥ Benefit No additional</td>
</tr>
</tbody>
</table>

**Level of Evidence**

A: Multiple randomized controlled trials

B: Single trial, non-randomized studies

C: Expert opinion

**Patient Education**

Patients with SIHD should be educated about the following lifestyle elements that could influence prognosis:

- **Weight control**
  - Maintenance of a BMI of 18.5 to 24.9 kg/m², and maintenance of a waist circumference less than 102 cm (40 inches) in men and less than 88 cm (35 inches) in women (less for certain racial groups);
  - Lipid management;
  - BP control;
  - Smoking cessation and avoidance of exposure to secondhand smoke;
  - Individualized medical, nutrition, and lifestyle changes for patients with diabetes mellitus to supplement diabetes treatment goals and education.

**Why weight control matters**

Abdominal obesity and increased risk of cardiovascular events

**Obesity Trends* Among U.S. Adults**

BRFSS, 1985

BRFSS, 1986

*BMI ≥30, or ~ 30 lbs overweight for 5'4" woman*
Weight Management Recommendations

Goal: BMI 18.5 to 24.9 kg/m²
Waist Circumference: Men: < 40 inches
Women: < 35 inches

Assess BMI and/or waist circumference on each visit and consistently encourage weight maintenance/reduction through an appropriate balance of physical activity, caloric intake, and formal behavioral programs when indicated.

If waist circumference (measured at the iliac crest) >35 inches in women and >40 inches in men initiate lifestyle changes and consider treatment strategies for metabolic syndrome as indicated.

The initial goal of weight loss therapy should be to reduce body weight by approximately 10 percent from baseline. With success, further weight loss can be attempted if indicated.

Patients with SIHD should be educated about the following lifestyle elements that could influence prognosis: weight control, maintenance of a BMI of 18.5 to 24.9 kg/m², and maintenance of a waist circumference less than 102 cm (40 inches) in men and less than 88 cm (35 inches) in women (less for certain racial groups); lipid management; BP control; smoking cessation and avoidance of exposure to secondhand smoke; and individualized medical, nutrition, and lifestyle changes for patients with diabetes mellitus to supplement diabetes treatment goals and education.

Patient Education

Lipid Management

Lifestyle modifications, including daily physical activity and weight management, are strongly recommended for all patients with SIHD.

Dietary therapy for all patients should include reduced intake of saturated fats (to <7% of total calories), trans fatty acids (to <1% of total calories), and cholesterol (to <200 mg/d).

ATP III Dietary Recommendations

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Recommended Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated fat</td>
<td>&lt;7% of total calories</td>
</tr>
<tr>
<td>Polyunsaturated fat</td>
<td>Up to 10% of total calories</td>
</tr>
<tr>
<td>Monounsaturated fat</td>
<td>Up to 20% of total calories</td>
</tr>
<tr>
<td>Total fat</td>
<td>25%–35% of total calories</td>
</tr>
<tr>
<td>Carbohydrate (esp. complex carbs)</td>
<td>50%–60% of total calories</td>
</tr>
<tr>
<td>Fiber</td>
<td>20–30 g/d</td>
</tr>
<tr>
<td>Protein</td>
<td>~15% of total calories</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>&lt;200 mg/d</td>
</tr>
</tbody>
</table>

*Trans fatty acids also raise LDL-C and should be kept at a low intake.

Note: Regarding total calories, balance energy intake and expenditure to maintain desirable body weight.

RRR per 40 mg/dL reduction in LDL cholesterol

Reduction in CV events with statin therapy

AIM-HIGH Primary Outcome

<table>
<thead>
<tr>
<th>Time (years)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>1.00</td>
<td>1.02</td>
<td>1.03</td>
<td>1.04</td>
<td>1.05</td>
</tr>
</tbody>
</table>

Statin Monotherapy

Statin-Niacin ER Combination Therapy

Log-rank P value = 0.79


In addition to therapeutic lifestyle changes, a moderate or high dose of a statin therapy should be prescribed, in the absence of contraindications or documented adverse effects.

Blood Pressure: Lower is Better

Ischemic Heart Disease Mortality and Blood Pressure

Patient Education

Patients with SIHD should be educated about the following lifestyle elements that could influence prognosis: weight control, maintenance of a BMI of 18.5 to 24.9 kg/m2, and maintenance of a waist circumference less than 102 cm (40 inches) in men and less than 88 cm (35 inches) in women (less for certain racial groups); lipid management; BP control; smoking cessation and avoidance of exposure to secondhand smoke; and individualized medical, nutrition, and life-style changes for patients with diabetes mellitus to supplement diabetes treatment goals and education.

Blood Pressure Management

All patients should be counseled about the need for lifestyle modification: weight control; increased physical activity; alcohol moderation; sodium reduction; and emphasis on increased consumption of fresh fruits, vegetables, and low-fat dairy products.

In patients with SIHD with BP 140/90 mm Hg or higher, antihypertensive drug therapy should be instituted in addition to or after a trial of lifestyle modifications.

Lipid Management (cont.)

JNC 7 Lifestyle Modifications for BP Control

<table>
<thead>
<tr>
<th>Modification</th>
<th>Recommendation</th>
<th>Approximate SBP Reduction Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight reduction</td>
<td>Maintain normal body weight (BMI=18.5-24.9)</td>
<td>5-20 mmHg/10 kg weight lost</td>
</tr>
<tr>
<td>Adopt DASH eating plan</td>
<td>Diet rich in fruits, vegetables, low fat dairy and reduced in fat</td>
<td>8-14 mmHg</td>
</tr>
<tr>
<td>Restrict sodium intake</td>
<td>&lt;2.4 grams of sodium per day</td>
<td>2-8 mmHg</td>
</tr>
<tr>
<td>Physical activity</td>
<td>Regular aerobic exercise for at least 30 minutes on most days of the week</td>
<td>4-8 mmHg</td>
</tr>
<tr>
<td>Moderate alcohol consumption</td>
<td>&lt;2 drinks/day for men and &lt;1 drink/day for women</td>
<td>2-4 mmHg</td>
</tr>
</tbody>
</table>

**Long-Term Antihypertensive Therapy Significantly Reduces CV Events**

![Graph showing reduction in events for Stroke, Myocardial infarction, and Heart failure.]


**Patient Education**

Patients with SIHD should be educated about the following lifestyle elements that could influence prognosis: **weight control**, maintenance of a BMI of 18.5 to 24.9 kg/m2, and maintenance of a waist circumference less than 102 cm (40 inches) in men and less than 88 cm (35 inches) in women (less for certain racial groups); **lipid management**; **BP control**; smoking cessation and avoidance of exposure to secondhand smoke; and individualized medical, nutrition, and lifestyle changes for patients with **diabetes mellitus** to supplement diabetes treatment goals and education.

**Intensive Glycemic Control: 2009 Meta-analysis**

<table>
<thead>
<tr>
<th>Event</th>
<th>Events/Total, n/n</th>
<th>Relative Risk (95% CI)</th>
<th>Risk Difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonfatal MI</td>
<td>511/14,662</td>
<td>0.84 (0.75 to 0.94)</td>
<td>-6 (96 to 3)</td>
</tr>
<tr>
<td>Fatal MI</td>
<td>540/14,662</td>
<td>0.94 (0.75 to 1.18)</td>
<td>-3 (-10 to 4)</td>
</tr>
<tr>
<td>Nonfatal stroke</td>
<td>423/14,662</td>
<td>0.92 (0.82 to 1.01)</td>
<td>-3 (-7 to 2)</td>
</tr>
<tr>
<td>Fatal stroke</td>
<td>88/14,662</td>
<td>0.67 (0.53 to 1.00)</td>
<td>0 (-2 to 1)</td>
</tr>
<tr>
<td>PAD</td>
<td>469/9,934</td>
<td>0.91 (0.79 to 1.03)</td>
<td>-3 (-6 to 1)</td>
</tr>
</tbody>
</table>

*Ann Intern Med. 2009;151:394-403*

**The ACCORD Trial: Primary Outcome (stroke, MI, CV death)**

- Multicenter NHLBI study: 10,251 patients randomized to intensive (A1C level of <6.0%) vs. standard (A1C level of 7.0%-7.9%)

- Kaplan-Meier curves for total mortality


**The ACCORD Trial: Kaplan-Meier Curves for TOTAL MORTALITY**

- For selected individual patients, such as those with a short duration of diabetes mellitus and a long life expectancy, a goal HbA1c of 7% or less is reasonable.

- A goal HbA1c between 7% and 9% is reasonable for certain patients according to age, history of hypoglycemia, presence of microvascular or macrovascular complications, or presence of coexisting medical conditions.

Diabetes Management (cont.)

Initiation of pharmacotherapy interventions to achieve target HbA1c might be reasonable.

Therapy with rosiglitazone should not be initiated in patients with SIHD.

Key Guideline Messages

- Patients with SIHD should generally receive a “package” of GDMT that include lifestyle interventions and medications shown to improve outcomes which includes (as appropriate):
  - Diet, weight loss and regular physical activity;
  - If a smoker, smoking cessation;
  - Aspirin 75-162mg daily;
  - A statin medication in moderate dosage;
  - If hypertensive, antihypertensive medication to achieve a BP <140/90; If diabetic, appropriate glycemic control.

Exercise Evidence: Mortality Risk

Observational study of self-reported physical activity in 772 men with established coronary heart disease


Light or moderate exercise is associated with lower risk

Physical Activity

For all patients, the clinician should encourage 30 to 60 minutes of moderate-intensity aerobic activity, such as brisk walking, at least 5 days and preferably 7 days per week, supplemented by an increase in daily lifestyle activities (e.g., walking breaks at work, gardening, household work) to improve cardiorespiratory fitness and move patients out of the least-fit, least-active, high-risk cohort (bottom 20%).

For all patients, risk assessment with a physical activity history and/or an exercise test is recommended to guide prognosis and prescription.
Physical Activity (cont.)

Medically supervised programs (cardiac rehabilitation) and physician-directed, home-based programs are recommended for at-risk patients at first diagnosis.

It is reasonable for the clinician to recommend complementary resistance training at least 2 days per week.

Aspirin Recommendations

Start and continue indefinitely aspirin 75 to 162 mg/d in all patients unless contraindicated.

Aspirin Evidence: Secondary Prevention

Effect of antplatelet therapy* on vascular events**

<table>
<thead>
<tr>
<th>Category</th>
<th>% Odds Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute myocardial infarction</td>
<td></td>
</tr>
<tr>
<td>Acute stroke</td>
<td></td>
</tr>
<tr>
<td>Prior myocardial infarction</td>
<td></td>
</tr>
<tr>
<td>Prior stroke/transient ischemic attack</td>
<td></td>
</tr>
<tr>
<td>Other high risk</td>
<td></td>
</tr>
<tr>
<td>Acute coronary artery disease (e.g. unstable angina, heart failure)</td>
<td></td>
</tr>
<tr>
<td>Peripheral arterial disease (e.g. intermittent claudication)</td>
<td></td>
</tr>
<tr>
<td>High risk of embolism (e.g. atrial fibrillation)</td>
<td></td>
</tr>
<tr>
<td>Other (e.g. diabetes mellitus)</td>
<td></td>
</tr>
<tr>
<td>All trials</td>
<td></td>
</tr>
</tbody>
</table>

Aspirin Evidence: Dose and Efficacy

Indirect Comparisons of Aspirin Doses on Vascular Events in High-Risk Patients

<table>
<thead>
<tr>
<th>Aspirin Dose</th>
<th>No. of Trials (%)</th>
<th>Odds Ratio for Vascular Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>500-1500 mg</td>
<td>34 19</td>
<td></td>
</tr>
<tr>
<td>160-325 mg</td>
<td>19 26</td>
<td></td>
</tr>
<tr>
<td>75-150 mg</td>
<td>12 32</td>
<td></td>
</tr>
<tr>
<td>&lt;75 mg</td>
<td>3 13</td>
<td></td>
</tr>
<tr>
<td>Any aspirin</td>
<td>65 23</td>
<td>P&lt;.0001</td>
</tr>
</tbody>
</table>

Stable CAD: PCI vs Conservative Medical Management

Meta-analysis of 11 randomized trials

<table>
<thead>
<tr>
<th>Favors</th>
<th>Favors PCI</th>
<th>Favors Medical Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>0.68</td>
<td>0.28</td>
</tr>
<tr>
<td>Cardiac death or MI</td>
<td>0.12</td>
<td>0.82</td>
</tr>
<tr>
<td>Nonfatal MI</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>CABG</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>PCI</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COURAGE Trial

Hypothesis PCI + Optimal Medical Therapy will be Superior to Optimal Medical Therapy Alone

Primary Outcome: Death or Nonfatal MI

- 1, 2, or 3 vessel disease
- 70% visual stenosis of proximal coronary segment
- Anatomy suitable for PCI
- CCS Class I-III angina
- Objective evidence of ischemia at baseline
- ACC/AHA Class I or II indication for PCI
**Risk Factor Goals**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>Cessation</td>
</tr>
<tr>
<td>Total Dietary Fat / Saturated Fat</td>
<td>&lt;30% calories / &lt;7% calories</td>
</tr>
<tr>
<td>Dietary Cholesterol</td>
<td>&lt;200 mg/day</td>
</tr>
<tr>
<td>LDL cholesterol (primary goal)</td>
<td>60-85 mg/dL</td>
</tr>
<tr>
<td>HDL cholesterol (secondary goal)</td>
<td>&gt;40 mg/dL</td>
</tr>
<tr>
<td>Triglyceride (secondary goal)</td>
<td>&lt;150 mg/dL</td>
</tr>
<tr>
<td>Physical Activity</td>
<td>30-45 min. moderate intensity 5X/week</td>
</tr>
<tr>
<td>Body Weight by Body Mass index</td>
<td>Initial BMI: 25-27.5, Weight Loss Goal: BMI &lt;25, 10% weight loss</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>&lt;130/85 mmHg</td>
</tr>
<tr>
<td>Diabetes</td>
<td>HbA1c &lt;7.0%</td>
</tr>
</tbody>
</table>


**Optimal Medical Therapy**

Pharmacologic
- Anti-platelet: aspirin; clopidogrel in accordance with established practice standards
- Statin: simvastatin ± ezetimibe or ER niacin
- ACE Inhibitor or ARB: lisinopril or losartan
- Beta-blocker: long-acting metoprolol
- Calcium channel blocker: amlodipine
- Nitrate: isosorbide 5-mononitrate

Applied to Both Arms by Protocol and Case-Managed


**Long-Term Improvement in Treatment Targets**

<table>
<thead>
<tr>
<th>Treatment Targets</th>
<th>Baseline</th>
<th>60 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PCI + OMT</td>
<td>OMT</td>
</tr>
<tr>
<td>SBP</td>
<td>131 ± 0.77</td>
<td>130 ± 0.66</td>
</tr>
<tr>
<td>DBP</td>
<td>74 ± 0.33</td>
<td>74 ± 0.33</td>
</tr>
<tr>
<td>Total Cholesterol mg/dL</td>
<td>177 ± 1.37</td>
<td>172 ± 1.41</td>
</tr>
<tr>
<td>LDL mg/dL</td>
<td>100 ± 1.17</td>
<td>102 ± 1.22</td>
</tr>
<tr>
<td>HDL mg/dL</td>
<td>39 ± 0.39</td>
<td>39 ± 0.37</td>
</tr>
<tr>
<td>TG mg/dL</td>
<td>143 ± 2.96</td>
<td>149 ± 3.93</td>
</tr>
<tr>
<td>BMI Kg/M²</td>
<td>28.7 ± 0.18</td>
<td>28.9 ± 0.17</td>
</tr>
<tr>
<td>Moderate Activity (5x/week)</td>
<td>25%</td>
<td>25%</td>
</tr>
</tbody>
</table>


**Survival Free of Death from Any Cause and Myocardial Infarction**

There was no difference between the two strategies


**Overall Survival**

There was no difference between the two strategies


**BARI 2D Study: Medical Therapy Versus Revascularization in DM**

Primary Outcome (All-Cause Death)


<table>
<thead>
<tr>
<th>Follow-Up (Years)</th>
<th>PCI</th>
<th>CABG</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>92</td>
<td>92</td>
</tr>
<tr>
<td>5</td>
<td>87</td>
<td>87</td>
</tr>
</tbody>
</table>

Hazard ratio: 0.87 for PCI vs. CABG (95% CI: 0.65-1.16) P = 0.38

**2011 ACCF/AHA/SCAI PCI Guideline**

- The findings from individual studies and systematic reviews of PCI vs medical therapy can be summarized as follows:
  - PCI reduces the incidence of angina
  - PCI has not been demonstrated to improve survival in stable patients
  - PCI may increase the short-term risk of MI
  - PCI does not lower the long-term risk of MI


---

**2012 – SIHD Guidelines**

**Indication for Revascularization for Survival Benefit**

- **Level of Rec.**
  - I
    - CABG for significant (≥50%) left main CAD.
    - CABG for significant (≥70%) stenoses in 3 major arteries (w/ or w/out prox LAD) or prox LAD +1 other major artery.
  - IIA
    - PCI as an alternative to CABG with significant unprotected left main CAD with: 1) low risk of PCI procedural complications 2) high surgical risk
    - CABG for significant (≥70% diameter) stenoses in 2 major coronary arteries with severe or extensive myocardial ischemia
    - CABG for mild-mod LV and significant (≥70%) multivessel CAD or proximal LAD disease

Fihn SD. J Am Coll Cardiol. 2012 Dec 18;60(24):e44-e164

---

**Key Guideline Messages**

- The relatively small proportion of patients who have “high-risk” anatomy (e.g., >50% stenosis of the left main coronary artery), revascularization of with CABG should be considered to potentially improve survival. Most data showing improved survival with surgery compared to medical therapy are several decades old and based on surgical techniques and medical therapies that have advanced considerably. There are no conclusive data demonstrating improved survival following PCI.

---

**Patient Education**

Patients with SIHD should be educated about the following lifestyle elements that could influence prognosis: weight control, maintenance of a BMI of 18.5 to 24.9 kg/m², and maintenance of a waist circumference less than 102 cm (40 inches) in men and less than 88 cm (35 inches) in women (less for certain racial groups); lipid management; BP control; smoking cessation and avoidance of exposure to secondhand smoke; and individualized medical, nutrition, and life-style changes for patients with diabetes mellitus to supplement diabetes treatment goals and education.
Potential Health Benefits of Smoking Cessation

Time After Smoking

- **20 min**
  - BP, HR, peripheral circulation improve
- **24 hrs**
  - CO levels drop
  - Nicotine eliminated; taste and smell improve
- **48 hrs**
  - Lung function can improve 30%
- **10 yrs**
  - Risk of lung cancer reduced 50%
- **15 yrs**
  - Risk of MI and stroke reduce to level of non smoker
- **1 yr**
  - Risk of MI reduced 50%
- **3-9 mo**
  - SOB and coughing decrease
- **2-12 wks**
  - BP, HR, peripheral circulation improve

Cigarette Smoking Recommendations

**Goal:** Complete Cessation and No Exposure to Environmental Tobacco Smoke

- Ask about tobacco use status at every visit.
- Advise every tobacco user to quit.
- Assess the tobacco user’s willingness to quit.
- Assist by counseling and developing a plan for quitting.
- Arrange follow-up, referral to special programs, or pharmacotherapy (including nicotine replacement and bupropion).
- Urge avoidance of exposure to environmental tobacco smoke at work and home.

Smoking Cessation

- Ask about smoking at every visit
- Advise all tobacco users to quit
  - “I strongly advise you to quit”
- Assess readiness to quit
- Assist in finding appropriate therapies
- Arrange follow up

Cohort Studies of Environmental Tobacco Smoke and CHD

<table>
<thead>
<tr>
<th>Source</th>
<th>Location, Date</th>
<th>Population</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hirayama</td>
<td>Japan 1984</td>
<td>91,540</td>
<td>1.2 (0.9-1.4)</td>
</tr>
<tr>
<td>Garland</td>
<td>US 1985</td>
<td>695</td>
<td>2.7 (0.7-10.5)</td>
</tr>
<tr>
<td>Svendsen</td>
<td>US 1987</td>
<td>1245</td>
<td>2.2 (0.7-6.9)</td>
</tr>
<tr>
<td>Helsing</td>
<td>US 1988</td>
<td>19035</td>
<td>M 1.3 (1.1-1.6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F 1.2 (1.1-1.4)</td>
</tr>
<tr>
<td>Hole</td>
<td>UK 1989</td>
<td>7987</td>
<td>2.0 (1.3-3.4)</td>
</tr>
<tr>
<td>Layard</td>
<td>US 1995</td>
<td>2916</td>
<td>M 0.97 (0.7-1.3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F 0.99 (0.8-1.2)</td>
</tr>
<tr>
<td>Tunstall-Pedoe</td>
<td>UK 1995</td>
<td>2278</td>
<td>2.7 (1.3-5.6)</td>
</tr>
<tr>
<td>Steenland</td>
<td>US 1996</td>
<td>309599</td>
<td>M 1.2 (1.1-1.4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F 1.1 (.96-1.3)</td>
</tr>
<tr>
<td>Kawachi</td>
<td>US 1987</td>
<td>32046</td>
<td>F 1.9 (1.1-3.3)</td>
</tr>
</tbody>
</table>

US studies on reduction of AMI associated with public smoking bans

<table>
<thead>
<tr>
<th>Setting</th>
<th>Author</th>
<th>Pop.</th>
<th>Period of study after ban</th>
<th>Effect of ban RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helena, Montana</td>
<td>BMJ. 2004 June 6; 328(7452): 1379-1386</td>
<td>68,000</td>
<td>5 years</td>
<td>0.60 (40%↓) (0.21-0.99)</td>
</tr>
<tr>
<td>Pueblo, Colorado</td>
<td>J Am Coll Cardiol 2009; 54(14): 1249-1259</td>
<td>150,000</td>
<td>18 months</td>
<td>0.73 (27%↓) (0.64-0.86)</td>
</tr>
<tr>
<td>Bowling Green,</td>
<td>J Am Coll Cardiol. 2009;54(14): 1249-1255</td>
<td>30,000</td>
<td>18 months</td>
<td>0.61 (39%↓) (0.55-0.67)</td>
</tr>
<tr>
<td>Ohio</td>
<td></td>
<td></td>
<td>36 months</td>
<td>0.53 (47%↓) (0.45-0.59)</td>
</tr>
</tbody>
</table>

Stable IHD: Improving Quality of Life with Anti-Ischemic Medications

Robert A. Kloner, MD, PhD
Director of Research
Heart Institute, Good Samaritan Hospital
Professor of Medicine
University of California, Los Angeles
Dual Goals for Management of Chronic CAD

Prevent MI and death (Disease Modification)
Improve “quantity” of life

Reduce ischemia and relieve anginal symptoms
Improve “quality” of life

http://circ.ahajournals.org/content/107/2/149.full.pdf+html

Angina Persists Despite Revascularization ± Optimal Medical Therapy (OMT)

Arterial Revascularization Therapies Study
(N = 1205)

COURAGE Study
(N=2287)

In the stenting and surgery patient groups, 10% to 20% of patients still experienced angina 1 year post revascularization.

More than one third of patients had angina/ischemia after 1 year despite OMT ± PCI

Effects of PCI vs Rx to Reduce Angina:
The COURAGE Trial

Compared with Optimal Medical Therapy alone, PCI is associated with a reduction in angina, but not after 5 yrs


Causes and consequences of myocardial ischemia: New understanding


Role of Cardiac Late Sodium Current

In normal myocardium, the late I\textsubscript{Na-L} does not contribute in a meaningful way to intracellular sodium concentrations

In conditions associated with myocardial ischemia, the late I\textsubscript{Na-L} is increased, leading to excess intracellular sodium

Myocytes then exchange the excess sodium for calcium, leading to intracellular calcium overload

Role of altered ion currents in adverse consequences of myocardial ischemia

Diastolic Relaxation Failure Increases Oxygen Consumption and Reduces Oxygen Supply

Increased myocardial tension during diastole:
- Increases myocardial O₂ consumption
- Compresses intramural small vessels
  - reduces myocardial blood flow
- Worsens ischemia and angina

Effective Drug Classes to Treat Angina in United States 2013

- Nitrates
- Beta-adrenergic blocking drugs
- Calcium Antagonists
- Late I₆₅ inhibitor (ranolazine)

Anti-Anginal Agents Approved for Angina in the United States

<table>
<thead>
<tr>
<th>Class</th>
<th>Nitrates</th>
<th>Beta blockers</th>
<th>Calcium-channel blockers</th>
<th>Late Na⁺ current inhibitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrates</td>
<td>Isosorbide dinitrate</td>
<td>Propranolol</td>
<td>Nifedipine</td>
<td>Ranolazine</td>
</tr>
<tr>
<td></td>
<td>Short acting (60-120 mg qd)</td>
<td>Long acting (80-240 mg qd)</td>
<td>Sustained release (30-90 mg qd)</td>
<td>500 mg bid and increase to 1000 mg bid, as needed, based on clinical symptoms</td>
</tr>
<tr>
<td></td>
<td>Sustained release (60-120 mg qd)</td>
<td>Metoprolol</td>
<td>Sustained release (60-120 mg qd)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nitroglycerin patch</td>
<td>Atenolol</td>
<td>Diltiazem</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.2-0.8 mg/hour</td>
<td>25-100 mg qd</td>
<td>Short-acting (40-120 mg qid)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nadolol</td>
<td>Sustained release (120-480 mg qd)</td>
<td></td>
</tr>
<tr>
<td>Beta blockers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Propranolol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long acting (80-240 mg qd)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metoprolol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Short acting (50-150 mg bid)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sustained release (100-300 mg qd)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium-channel blockers</td>
<td>Nitroglycerin</td>
<td>Amlodipine</td>
<td>Nifedipine</td>
<td>Ranolazine</td>
</tr>
<tr>
<td></td>
<td>Sustained release (30-90 mg qd)</td>
<td>Short acting (2.5-10 mg qd)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late Na⁺ current inhibitor</td>
<td>Nifedipine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sustained release (60-120 mg qd)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ranolazine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>500 mg bid and increase to 1000 mg bid, as needed, based on clinical symptoms</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Meta-Analysis: β-Blockers, Calcium Channel Blockers, and Nitrates for Stable Angina

<table>
<thead>
<tr>
<th>Effect Size (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac Death*</td>
</tr>
<tr>
<td>β-blockers vs.</td>
</tr>
<tr>
<td>Long-acting nitrates vs. calcium channel blockers (12 trials)</td>
</tr>
<tr>
<td>Long-acting nitrates vs. β-blockers (6 trials)</td>
</tr>
</tbody>
</table>

*Reference : 1.0.  †Reference : 0.0.


Physiologic Effects of Antianginal Treatments

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Coronary blood flow</th>
<th>Heart rate</th>
<th>Arterial pressure</th>
<th>Venous return</th>
<th>Myocardial contractility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta-blockers</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>DHP CCBs</td>
<td>↑↑</td>
<td>↑↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Non-DHP CCBs</td>
<td>↑↑</td>
<td>↑↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Long-acting nitrates</td>
<td>↑↑</td>
<td>↑↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Ranolazine</td>
<td>↑↑</td>
<td>↑↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Revascularization</td>
<td>↑↑</td>
<td>↑↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

Ranolazine: Mechanism of Action

Ischemia  Ranolazine: Inhibits the late inward Na⁺ current
↓ Late I₆₅

Na⁺ Overload

Ca⁺⁺ Overload

Diastolic relaxation failure (increased diastolic tension)
Extravascular compression
Anti-anginal Effects in Combination with Other Anti-anginals: 3 Randomized Trials

CARISA  n=823
ERICA  n=565
MERLIN-TIMI 35  n=6560

PLACEBO                     RANOLAZINE

(EVents/wk)  (Events/wk)  (% of patients)

Morrow DA et al.  JAMA 2007;297:1775-1783
Chaitman BR et al.  JAMA 2004;291:309-316
Stone PH et al.  JACC 2006;48:566-575

36% ↓  P <0.001
23% ↓  P = 0.028
23% ↓  P = 0.023

Anti-Ischemic Effect of Ranolazine Without Affecting Heart Rate or Blood Pressure


Values at heart rates means ± SE from a mixed-model repeated measures analysis of variance.

MERLIN-TIMI 36: Major Efficacy Endpoints in Pts with Hx Chronic Angina

23% ↓  P = 0.048
23% ↓  P = 0.005
22% ↓  P = 0.002
14% ↓  P = 0.017

Placebo  (n=3,565)
Ranolazine  (n=3,565)

Worsening Angina: 8.1 vs 5.6%
New Anti-Anginal Rx: 16.4 vs 12.5%
Recurrent Ischemia: 21.1 vs 16.5%
Primary Endpoint: 29.4 vs 25.2%

Merlin-Timi 36: Change in HbA1c (%) Stratified by Diabetes Status

Patients with Diabetes Mellitus

No Diabetes Mellitus


MERLIN-TIMI 36: Safety and Tolerability

Death - any cause (N) 175 172 0.99  p = 0.91
Sudden cardiac death 65 56 0.87  p = 0.43
Death or CV Hosp 1082 1046 0.98  p = 0.67
Symptomatic Documented arrhythmia 102 99 0.97  p = 0.84

Tolerability (AE > 4%)
Dizziness (%) 7 13
Nausea 6 9
Constipation 3 9
Asthenia 3 5

Syncope (includes vasovagal) 2 3  p = 0.011

Merrow DA et al. JAMA 2007;297(16):1647-52
Effect of Ranolazine on Angina and NTG Use in Type 2 Diabetic Patients: TERISA Trial

Kosiborod M et al. J Am Coll Cardiol. 2013;Mar 7 (epub ahead of print)

Exploratory Analysis of Anti-Anginal Efficacy Based on HgbA1c

Kosiborod M et al. J Am Coll Cardiol. 2013;Mar 7 (epub ahead of print)

ASSOCIATE Study: Ivabradine Add-On Therapy in Chronic Stable Angina


Both groups continued to received atenolol 50 mg/day.

Ioabradine 7.5 mg bid (n=449) Placebo (n=440)

Change From Baseline

Total Exercise Duration (seconds)

Time to Limiting Angina (seconds)

Time to Angina Onset (seconds)

Time to 1-mm ST-Segment Depression (seconds)

Placebo (n=440)

Ivabradine 7.5 mg bid (n=449)

24.7 17.7 9.4 60.1 45.1

26.9 20.6 14.2 60.1 45.1

Placebo (n=440)

Ivabradine 7.5 mg bid (n=449)

24.7 17.7 9.4 60.1 45.1

26.9 20.6 14.2 60.1 45.1

Visual symptoms more common than placebo: photopsia, stroboscopic effect, atypical blurred vision. Ivabradine not FDA Approved

Ivabradine not FDA Approved

**P<0.05. **P<0.05 compared with placebo.

**P<0.001. **P<0.001 compared with placebo.

Ivabradine not FDA Approved

Bradycardia: ivabradine 4.2%, placebo 0.5%

Phosphenes and blurred vision: ivabradine 2%, placebo 0.9%

ASSOCIATE Study: Ivabradine Add-On Therapy in Chronic Stable Angina


Anti-Anginal Therapy:

Conditions That May Limit Their Uses

β-Blockers

- Asthma
- Severe bradycardia
- AV block
- Severe depression
- Raynaud’s syndrome
- Sick sinus syndrome

Nitrates

- Severe aortic stenosis
- Hypertrophic obstructive cardiomyopathy
- Erectile dysfunction*

Calcium Channel Blockers†

- AV block
- Bradycardia
- Heart failure
- LV dysfunction
- Sinus node dysfunction

Ranolazine‡

- QT-prolonging drugs or marked QT prolongation
- Strong CYP 3A4 inhibitors (eg, ketoconazole)
- Severe hepatic insufficiency

†Non-dihydropyridine.

‡Treated with PDE5 inhibitors.


2. Chairman B et al Nature Reviews Cardiol August 30, 2011
Beta blockers should be prescribed as initial therapy for relief of symptoms in patients with SIHD.

Calcium channel blockers or long-acting nitrates should be prescribed for relief of symptoms when beta blockers are contraindicated or cause unacceptable side effects in patients with SIHD.

Calcium channel blockers or long-acting nitrates, in combination with beta blockers, should be prescribed for relief of symptoms when initial treatment with beta blockers is unsuccessful in patients with SIHD.

Sublingual nitroglycerin or nitroglycerin spray is recommended for immediate relief of angina in patients with SIHD.

Treatment with a long-acting nondihydropyridine calcium channel blocker (verapamil or diltiazem) instead of a beta blocker as initial therapy for relief of symptoms is reasonable in patients with SIHD.

Ranolazine can be useful when prescribed as a substitute for beta blockers for relief of symptoms in patients with SIHD if initial treatment with beta blockers leads to unacceptable side effects or is ineffective or if initial treatment with beta blockers is contraindicated.

Ranolazine in combination with beta blockers can be useful when prescribed for relief of symptoms when initial treatment with beta blockers is not successful in patients with SIHD.

Although ranolazine has been well studied in SIHD, the agent was not administered in the COURAGE study, and further clinical evaluation is needed, especially of ranolazine as an element of intensive interventions for multiple risk factors.

Angina persists for many patients despite medical therapy and/or revascularization.

Mechanistic understanding of ischemia has undergone a paradigm shift:
- Traditional focus: determinants of myocardial O₂ supply/demand
- Contemporary focus: Changes in Na⁺ and Ca²⁺ currents during ischemia, electrical instability, diastolic dysfunction

Individualize therapy
- Novel agents with new mechanisms increase treatment options

56 yo man came to see you after ~9 months of exertional chest discomfort
- Works in a supermarket stacking boxes and stocking shelves
- CP reliably reproducible going up stairs and pushing large boxes
- Always worse after his cigarette break
- Resolves within 2-3 minutes of rest
- Can occur 2-4 times per day
- No symptoms at rest or with ADLs.
History

- Past history significant for hypertension and hypothyroidism
- Medications: lisinoprol 5 mg qd and levothyroxine
- He does not drink, but he occasionally uses marijuana
- Smokes 10 cigs/ day, down from peak of a pack/day for 25 yrs
- Currently having financial problems but health insurance through work covers medications

Physical Exam

- Wgt 219 lbs. HR 60. BP 170/90.
- Carotids 2+ with normal upstrokes. and no bruits. His JVP not elevated.
- Clear chest.
- Cardiac exam: normal PMI, S1, S2, +S4 and a 1/6 systolic ejection murmur at the LUSB.
- Abdomen is soft without any masses or bruits.
- Good femoral, popliteal, and distal pulses without any edema

ECG and Labs

- Chol 188, LDL 129, HDL 42, Trig 87
- K+ 4.4, Cr 1.0, TSH 4.4, Hb A1c 6.1%

Question 1

What would be your first diagnostic test?
1. Coronary angiography
2. CT angiography
3. ETT alone
4. ETT with imaging (echo or MPI)
5. Echocardiography

Question 2

Which medications would you start?
1. ASA, statin, b-blocker
2. ASA, statin, long-acting nitrate
3. ASA, statin, calcium channel blocker
4. ASA, statin, ranolazine
5. ASA, clopidogrel, statin, and either b-blocker, CCB, long acting nitrate or ranolazine
Question 3
What would be your next diagnostic test?
1. Coronary angiography
2. CT angiography
3. ETT with imaging (echo or MPI)
4. Echocardiography

Echo
• Left Ventricle: Normal in size with mild LVH. EF 60-65% with no regional WMA.

  Ao Valve – mildly calcific, peak gradient 20 mmHg. Calculated AVA 1.5 cm², consistent with mild stenosis

Follow-up 4 weeks later
His symptoms are better with addition of B-blocker. However, still experiencing angina 7-10 times per week with exertion.

Question 4
How would you manage this patient?
1. Refer to catheterization
2. Continue to optimize medical therapy
3. Repeat ETT with imaging

Follow-Up
The patient was offered catheterization but after extensive discussion, decided to decline due to fear of the procedure.

  On exam, HR 52 and BP 150/88. No evidence of volume overload.
  ECG unchanged with normal intervals

Question 5
What changes to his regimen (ASA, statin, b-blocker) would you make?
1. Increase b-blocker dose
2. Add long-acting nitrate
3. Add calcium channel blocker
4. Add ranolazine
5. Refer for EECP
Follow-up

Amlodipine 5 mg added and then uptitrated to 10 mg.
3 weeks later, BP now better controlled and symptoms improved, though still with episodes 1-2 times a week at peak exertion. Now smoking 1-3 cigarettes per day.

He agrees to have another ETT.

ETT #2

• 8:45 min on a Bruce protocol
• Stopped due to SOB and chest and jaw discomfort
• BP 110/70 to 126/76 and peak heart rate was 110
• Downward sloping depressions of 1 mm in II, III, F, V4, V5 and V6 and these resolved in 4 minutes into recovery

Question 6

What would you do next?

1. Add long-acting nitrate
2. Add ranolazine
3. Try to convince to finally proceed with catheterization
4. Raise the flag and declare victory

Outcomes Question # 1

What is your overall confidence in prescribing current guideline-directed lifestyle interventions and pharmacologic medications, and in treating to guideline-directed risk factor goals, for patients with stable ischemic heart disease?

1) Not at all confident
2)
3)
4)
5)
6)
7) Completely confident

Outcomes Question # 2

According to the 2011 ACCF/AHA/SCAI PCI guidelines, which of the following research findings regarding PCI compared to medical therapy is/are TRUE?

1) PCI reduces the incidence of angina
2) PCI may increase the short-term risk of MI
3) PCI has not been shown to improve survival in stable patients
4) PCI does not lower the long-term risk of MI
5) All of the above
6) 1 and 3 only

Outcomes Question # 3

What is your overall confidence of the similarities and differences in mechanisms of action and hemodynamic profiles of antianginal therapies?

1) Not at all confident
2)
3)
4)
5)
6)
7) Completely confident