Chronic Stable Angina: Managing Patients With Persistent Symptoms

Baltimore, MD

December 3, 2008
3:30 PM – 4:45 PM
Session 6: Chronic Stable Angina: Managing Patients With Persistent Symptoms

Learning Objectives

- Outline the screening questions listed in the American College of Cardiology/American Heart Association guidelines used to monitor quality of life in patients with chronic stable angina.
- Describe therapies that can be added to conventional medical therapies to improve or restore the quality of life in chronic angina patients who are experiencing worsening symptoms.

Faculty

Jerome D. Cohen, MD, FACC, FACP, FAHA  
Professor Emeritus, Division of Cardiology  
St. Louis University School of Medicine  
St. Louis, Missouri

Jerome D. Cohen, MD, FACC, FACP, FAHA, is professor emeritus in the Division of Cardiology at St. Louis University School of Medicine. He has been active in cardiovascular research for more than 3 decades. Dr Cohen has authored more than 165 scientific articles and book chapters on heart disease with a primary focus on the prevention of cardiovascular disease, including the treatment of silent myocardial ischemia and risk factors such as hypertension and dyslipidemias. He has been an investigator in many landmark studies of CVD in these areas of investigation. He has served as a member of multiple committees and review boards including the Executive (Writing) Committee and review committee for the 6th and 7th report of the Joint National Committee on the Detection, Evaluation and Treatment of High Blood Pressure. Dr Cohen is a graduate of The Johns Hopkins University and Washington University School of Medicine.

Faculty Financial Disclosure Statement

The presenting faculty reported the following:
Dr Cohen has no relationships to disclose.

Drug List

<table>
<thead>
<tr>
<th>Generic</th>
<th>Trade</th>
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</thead>
<tbody>
<tr>
<td>amlodipine</td>
<td>Norvasc</td>
</tr>
<tr>
<td>aspirin</td>
<td>various</td>
</tr>
<tr>
<td>atorvastatin</td>
<td>Lipitor</td>
</tr>
<tr>
<td>clopidogrel</td>
<td>Plavix</td>
</tr>
<tr>
<td>lisinopril</td>
<td>Prinivil, Zestril</td>
</tr>
<tr>
<td>metoprolol succinate ER</td>
<td>Toprol XL</td>
</tr>
<tr>
<td>nitrates, long acting</td>
<td>Ranexa</td>
</tr>
<tr>
<td>ranolazine</td>
<td>Coumadin, Jantoven</td>
</tr>
<tr>
<td>warfarin</td>
<td></td>
</tr>
</tbody>
</table>

Suggested Reading List


Boden WE. Management of chronic coronary disease: is the pendulum returning to equipoise? *Am J Cardiol.* 2008;101(suppl):69D-74D.


Chronic Stable Angina: Managing Patients with Persistent Symptoms

Jerome D. Cohen, MD, FACC, FACP, FAHA

Chronic Ischemic Heart Disease: Overview

- Highly prevalent
  - 9.1 million in the US
- Multifactorial etiology
  - CAD, hypertension, hypertrophic cardiomyopathy, valvular heart disease
- High socioeconomic burden
  - Depression
  - Quality of life
  - High costs of care

Heart Disease and Stroke Statistics — 2008 Update, American Heart Association

Case Study: 65-year-old African American woman with persistent angina

65-year-old African American woman

- New patient
- Semi-retired real estate agent, works periodically
- Chest pain and short of breath during modest activity for past 6 months.

History

- Medical history
  - Hypertension and hypercholesterolemia
  - Post-MI 2 years ago:
    - LVEF by ECHO 48%
    - Angiogram revealed triple-vessel disease with complex lesions not amenable to PCI
    - Triple-vessel CABG (mammary to LAD). Chest pain recurred 18 months after.
    - Repeat CABG ruled out from angiogram
    - Prefers medical treatment

- Family history
  - Father: hypercholesterolemia, MI at 64 years

- Social history
  - Smoked 1 pack/day for 25 years, quit 5 years ago
  - Occasional glass of wine with dinner (2–3 glasses per week)
  - Sedentary lifestyle
  - Tries to adhere to recommended diet

- Aspirin 81 mg
- ER metoprolol succinate 50 mg
- Amlodipine 10 mg
- Lisinopril 40 mg
- Long-acting nitrates Max dose (HA)

Current medications (qd)
65-year-old African American woman

Physical exam & laboratory values (on medication)

<table>
<thead>
<tr>
<th>Physical exam</th>
<th>Laboratory Values</th>
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</thead>
<tbody>
<tr>
<td>BP (mm Hg)</td>
<td>138/82</td>
</tr>
<tr>
<td>HR (bpm)</td>
<td>78</td>
</tr>
<tr>
<td>HT (in)</td>
<td>68</td>
</tr>
<tr>
<td>WT (lb)</td>
<td>184</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>28</td>
</tr>
<tr>
<td>LDL-C (mg/dL)</td>
<td>76</td>
</tr>
<tr>
<td>HDL-C (mg/dL)</td>
<td>46</td>
</tr>
<tr>
<td>Total-C (mg/dL)</td>
<td>146</td>
</tr>
<tr>
<td>TG (mg/dL)</td>
<td>120</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>1.1</td>
</tr>
<tr>
<td>Fasting glucose (mg/dL)</td>
<td>103</td>
</tr>
<tr>
<td>A1C (%)</td>
<td>5.8</td>
</tr>
</tbody>
</table>

Other observations:
No evidence of heart failure in physical exam
ECG: Sinus rhythm, rate 70 bpm, Q waves in inferior leads,
Stress test confirms myocardial ischemia
ECHO: LVEF 48%
Chest X-ray: Normal

ARS Question #1

After emphasizing diet and exercise (weight loss), what would you do about her medications?
1) Make no Rx changes
2) Increase B-blocker dose (to 100 mg/day)
3) Increase statin dose (to 40 mg/day)
4) Add ranolazine 500 mg bid

Symptoms occur at end of ischemic cascade

- Abnormalities occurring during ischemia
- Angina
- ST
- Relaxation (diastolic dysfunction)
- Systolic dysfunction
- Magnitude of ischemia

Management of Chronic CAD: Objectives

- Reduce ischemia and relieve anginal symptoms
- Improve “quality” of life
- Prevent MI and death
- Modify natural history of disease (Improve “quantity” of life)

Chronic stable angina: Pharmacotherapy

ACC/AHA guidelines

<table>
<thead>
<tr>
<th>A</th>
<th>A</th>
<th>B</th>
<th>A</th>
</tr>
</thead>
</table>
| Aspirin | β-blockers in patients with prior MI | β-blockers in patients without prior MI | Lipid-lowering therapy in patients with suspected CAD and LDL-C >130 mg/dL (target LDL-C <100 mg/dL)

ACEI in all patients with CAD who have diabetes and/or LV systolic dysfunction

2007 Chronic Angina Recommendations

Smoking Cessation

- Assess tobacco use.
- Strongly encourage patient and family to stop smoking.
- Avoidance of exposure to environmental tobacco smoke at work and home.
- Follow-up referral to special programs and/or pharmacotherapy recommended as appropriate. (Ask, Advise, Assess, Assist, Arrange).
2007 Chronic Angina Recommendations

**Weight Management/Physical Activity**
- Recommend weight management and physical activity as appropriate.
- The patient’s risk should be assessed with a physical activity history. Where appropriate, an exercise test is useful to guide the exercise prescription.
- Encourage minimum of 30 to 60 minutes of activity, preferably daily, or at least 3 or 4 times weekly supplemented by an increase in daily lifestyle activities.
- Medically supervised programs (cardiac rehabilitation) are recommended for at-risk patients (e.g., recent acute coronary syndrome or revascularization, heart failure).
- Expanding physical activity to include resistance training on 2 days per week may be reasonable.

Fraker et al. J Am Coll Cardiol. 2007;50 (23): 2264 -74

**Antiplatelet Agents/Anticoagulants**
- Aspirin should be started at 75 to 162 mg daily and continued indefinitely in all patients unless contraindicated.
- Clopidogrel after PCI
- Warfarin to international normalized ratio (INR) 2.0 to 3.0 in post-MI patients when clinically indicated or for those not able to take aspirin or clopidogrel.
- Use of warfarin in conjunction with aspirin and/or clopidogrel is associated with an increased risk of bleeding and should be monitored closely.

Fraker et al. J Am Coll Cardiol. 2007;50 (23): 2264 -74

**Renin-Angiotensin-Aldosterone System Blockers**
- Angiotensin receptor blockers are recommended for patients who have hypertension, have indications for but are intolerant of ACE inhibitors, have heart failure, or have had a myocardial infarction with left ventricular ejection fraction less than or equal to 40%. Angiotensin receptor blockers may be considered in combination with ACE inhibitors for heart failure due to left ventricular systolic dysfunction.
- Aldosterone blockade is recommended for use in post-MI patients without significant renal dysfunction or hyperkalemia who are already receiving therapeutic doses of an ACE inhibitor and a beta blocker, have a left ventricular ejection fraction less than or equal to 40%, and have either diabetes or heart failure.

Fraker et al. J Am Coll Cardiol. 2007;50 (23): 2264 -74

**ACE Inhibition**
- ACE inhibitors should be started and continued indefinitely in all patients with left ventricular ejection fraction less than or equal to 40% and in those with hypertension, diabetes, or chronic kidney disease unless contraindicated.
- Use as needed to manage blood pressure or symptoms in all other patients.
- It is reasonable to use ACE inhibitors among lower-risk patients with mildly reduced or normal left ventricular ejection fraction in whom cardiovascular risk factors are well controlled and revascularization has been performed.

Fraker et al. J Am Coll Cardiol. 2007;50 (23): 2264 -74

**Beta Blockers**
- Use as needed to manage angina, rhythm, or blood pressure.
- It is beneficial to start and continue beta-blocker therapy indefinitely in all patients who have had MI, acute coronary syndrome, or left ventricular dysfunction with or without heart failure symptoms, unless contraindicated.

Fraker et al. J Am Coll Cardiol. 2007;50 (23): 2264 -74
### 2007 Chronic Angina Recommendations

#### Blood Pressure Control

- **Lifestyle modification** (weight loss, physical activity, alcohol moderation, moderate sodium restriction, and emphasis on fruits, vegetables, and low-fat dairy products) in all patients with blood pressure greater than or equal to 140/90 mm Hg.
- Blood pressure control according to Joint National Conference VII guidelines is recommended (i.e., blood pressure less than 140/90 mm Hg or less than 130/80 mm Hg for patients with diabetes or chronic kidney disease).
- For hypertensive patients with coronary artery disease, it is useful to add blood pressure medication as tolerated, treating initially with beta blockers and/or ACE inhibitors, with addition of other drugs as needed to achieve target blood pressure.

**References:** Fraker et al. *J Am Coll Cardiol.* 2007;50 (23): 2264 -74

#### Lipid Management

- LDL-C should be <100 mg/dL and reduction of LDL-C to <70 mg/dL. Use of high-dose statin therapy is reasonable.
- Start dietary therapy in all patients (less than 7% saturated fat and less than 200 mg per dl cholesterol) and promote physical activity and weight management. Encourage increased consumption of omega-3 fatty acids.
- Consider omega-3 fatty acids as adjunct for high TG. For all patients, encouraging consumption of omega-3 fatty acids in the form of fish, or in capsule form (1 g per day) for risk reduction may be reasonable. For treatment of elevated TG, higher doses are usually necessary for risk reduction.

**References:** Fraker et al. *J Am Coll Cardiol.* 2007;50 (23): 2264 -74

#### Diabetes Management

Diabetes management should include lifestyle and pharmacotherapy measures to achieve a near-normal HbA1c.

**References:** Fraker et al. *J Am Coll Cardiol.* 2007;50 (23): 2264 -74

### Patient Assessment at Every Visit

- Change in level of physical activity?
- Change in frequency/severity of symptoms?
- Medication compliance/tolerance
- Progress in lifestyle changes?
- New co-morbid conditions or drug Rx?

### Anti-Ischemic Strategies in Chronic Symptomatic CAD

<table>
<thead>
<tr>
<th>Initial Medical Therapy</th>
<th>Persistent Angina or High Risk Features</th>
<th>Recurrent ischemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI</td>
<td></td>
<td>Repeat revascularization (if possible)</td>
</tr>
<tr>
<td>Revascularization</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Referenced:***

- Angiography therapy: TMR OTHER MEASURES ECP SCS


### 2002 ACC/AHA Class I Revascularization Recommendations in Chronic Angina

**Class I**

1. CABG for patients with significant LMD (Level of Evidence: A)
2. CABG for patients with 3-vessel disease The survival benefit is greater in patients with abnormal LVEF ≤ 0.5 (Level of Evidence: A)
3. CABG for patients with 2-vessel disease with significant proximal LAD CAD and either abnormal LVEF ≤ 0.5 or demonstrable ischemia on non-invasive testing (Level of Evidence: A)
4. PCI for patients with 2- or 3-vessel disease with significant proximal LAD CAD, who have anatomy suitable for catheter-based therapy and normal LV function and who do not have treated diabetes (Level of Evidence: B)

2002 ACC/AHA Class I
Revascularization Recommendations in Chronic Angina, cont’d

Class I, cont’d
5. CABG for patients with 1- or 2-vessel CAD without significant proximal LAD CAD who have survived SCD or sustained VT (Level of Evidence: C)
6. In patients with prior PCI, CABG, or PCI for recurrent stenosis associated with a large area of viable myocardium or high-risk criteria on noninvasive testing (Level of Evidence: C)
7. PCI or CABG for patients who have not been successfully treated by medical therapy (see text) and can undergo revascularization with acceptable risk (Level of Evidence: B)
8. PCI or CABG for patients with 1- or 2-vessel CAD without significant proximal LAD CAD but with a large area of viable myocardium and high-risk criteria on noninvasive testing (Level of Evidence: B)

LAD, left anterior descending; CAD, coronary artery disease; PCI, percutaneous coronary intervention; SCD, sudden cardiac death; VT, ventricular tachycardia.


Major cardiac events occur in non-target areas following successful PCI

Intensity of Medical Therapy and Outcomes

COURAGE: Background and rationale
In patients with stable CAD
• Elective PCI procedures are common in the US (~85% of patients)
• PCI decreases angina frequency but long-term prognostic effects on CV events are not known
• Antianginal agents also provide symptom relief
• ACEIs, ASA, β-blockers, and statins have been shown to prevent MI and death

COURAGE was designed to evaluate whether PCI plus optimal medical therapy reduces risk of major CV events compared with optimal medical therapy alone in stable CAD patients

COURAGE: Study design

Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation

AHA/ACC Class III indications for PCI, suitable coronary artery anatomy and 270% stenosis in 21 proximal epicardial vessel + objective evidence of ischemia or 20% stenosis + class III angina without provocation testing

Optimal medical therapy* + PCI
(n = 1148)

Randomized

Optimal medical therapy
(n = 1139)

Primary outcome:
All-cause mortality, nonfatal MI

Follow-up: Median 4.6 years

*Intensive pharmacologic therapy + lifestyle intervention

COURAGE: Treatment effect on primary outcome

**HR 1.05***(0.87-1.27)  P = 0.62


All-cause death, MI

**Medical therapy                    PCI + medical therapy**

<table>
<thead>
<tr>
<th>No. at risk</th>
<th>Medical therapy</th>
<th>PCI</th>
<th>Medical therapy</th>
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<td>269</td>
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<tr>
<td></td>
<td>30</td>
<td>38</td>
<td>30</td>
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</tbody>
</table>

Survival free of primary outcome

*Unadjusted

COURAGE: Summary and implications

**In patients with stable CAD**

- When added to optimal medical therapy, PCI ↓ angina
  - PCI did not reduce long-term rates of death, MI, or hospitalization for ACS
- Findings reinforce existing clinical practice guidelines
  - PCI can be safely deferred if intensive medical therapy is instituted and maintained
- Initial management approach for many patients includes:
  - Lifestyle modification + pharmacologic therapy (diet, physical activity, antiplatelet, antianginal, BP, lipids, and glucose)
  - Some patients (~1/3) may require eventual revascularization


Persistent ischemia (angina) despite PCI

N = 1620 consecutive NHLBI Dynamic Registry patients; 1 year post-PCI

Desire adjunctive antianginal therapy, 26% of patients reported recent angina

Antianginal therapy

Patients (%)

<table>
<thead>
<tr>
<th>Nitrates</th>
<th>CCBs</th>
<th>β-blockers</th>
<th>α1 antihypertensives</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>27.3</td>
<td>25.9</td>
<td>60.9</td>
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<tr>
<td>20</td>
<td>30.6</td>
<td>29.3</td>
<td>76.5</td>
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<tr>
<td>40</td>
<td>40.0</td>
<td>38.7</td>
<td>98.6</td>
</tr>
<tr>
<td>60</td>
<td>59.9</td>
<td>58.3</td>
<td>118.6</td>
</tr>
<tr>
<td>80</td>
<td>80.0</td>
<td>79.4</td>
<td>130.8</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>99.7</td>
<td>132.2</td>
</tr>
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</table>


Persistent ischemia (angina) despite optimal revascularization

Arterial Revascularization Therapies Study

Free of angina  Free of antihypertensive medication
Free of angina + antihypertensive medication

Patients (%)

<table>
<thead>
<tr>
<th>Stenting group*</th>
<th>Surgery group*</th>
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<tbody>
<tr>
<td>78.9</td>
<td>69.5</td>
</tr>
<tr>
<td>21.1</td>
<td>30.5</td>
</tr>
<tr>
<td>19.1</td>
<td>41.5</td>
</tr>
<tr>
<td>19.1</td>
<td>38.4</td>
</tr>
</tbody>
</table>


ACC/AHA Angina Guidelines Recommend Complete Relief Without Side Effects

...the goal of treatment should be complete, or nearly complete, elimination of anginal chest pain and return to normal activities and a functional capacity of CCS class I angina...with minimal side effects of therapy.


Ischemia is related to myocardial O2 supply and demand

Adapted from Morrow DA et al. In: Braunwald’s Heart Disease. 7th ed.
Older antianginal drugs: Pathophysiologic effects

<table>
<thead>
<tr>
<th>Drug class</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>β-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>
</tbody>
</table>

CCB = calcium channel blocker
DHP = dihydropyridine

“Unmet needs” in treating persistent angina

- Despite medical therapy and/or revascularization, some patients continue to experience angina
- Current treatment options for persistent angina are limited
- Newer treatment approaches are now available
- How best to manage symptomatic patients?

Ranolazine: Pathophysiologic effects vs older antianginals

Older antianginal drugs: Clinical conditions that may limit use

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>β-blockers</th>
<th>Nitrates</th>
<th>Calcium channel blockers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>Severe aortic stenosis</td>
<td>AV block*</td>
<td></td>
</tr>
<tr>
<td>Severe bradycardia</td>
<td>Hypertrophic obstructive cardiomyopathy</td>
<td>Bradyarrhythmia*</td>
<td></td>
</tr>
<tr>
<td>AV block</td>
<td>Severe depression</td>
<td>Heart failure*</td>
<td></td>
</tr>
<tr>
<td>Non-DHP CCBs</td>
<td>Diabetes</td>
<td>Hypertrophic obstructive cardiomyopathy*</td>
<td></td>
</tr>
<tr>
<td>Non-DHP CCBs</td>
<td>Raynaud’s syndrome</td>
<td>Left ventricular dysfunction*</td>
<td></td>
</tr>
<tr>
<td>Peripheral vascular disease</td>
<td>Sick sinus syndrome</td>
<td>Sinus node dysfunction*</td>
<td></td>
</tr>
</tbody>
</table>

Late Na+ current inhibition: Ranolazine

CARISA: Ranolazine reduces angina frequency

<table>
<thead>
<tr>
<th>Drug</th>
<th>Anginal episodes per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo</td>
<td>4.4</td>
</tr>
<tr>
<td>Ranolazine SR 750 mg bid</td>
<td>4.3</td>
</tr>
<tr>
<td>Ranolazine SR 1000 mg bid</td>
<td>4.5</td>
</tr>
</tbody>
</table>

P < 0.001

ERICA: Ranolazine reduces angina frequency and nitrate consumption

N = 565


Components of Primary Endpoint

- CV Death or MI (%)
- Recurrent Ischemia (%)

Morrow DA et al. JAMA 2007; 297: 1775-83

Assessment of Anti-anginal Effects

- Worsening Angina (%)*
- Antianginal Increase (%)*

Morrow DA et al. JAMA 2007; 297: 1775-83

Ranolazine prescribing information. Available at http://www.fda.gov/cder/foi/label/2008/021526s004lbl.pdf

Current Indications for Ranolazine Extended Release

- Indicated for the treatment of chronic angina
- May be used with beta-blockers, nitrates, calcium channel blockers, anti-platelet therapy, lipid-lowering therapy, ACE inhibitors, and angiotensin receptor blockers.
- Initiate therapy at 500 mg bid and increase to 1000 mg bid (maximum recommended), as needed, based on clinical symptoms

Ranolazine prescribing information. Available at http://www.fda.gov/cder/foi/label/2008/021526s004lbl.pdf

Ranolazine Safety and Tolerability

- Most adverse events were well-tolerated, with <5% of patients discontinuing treatment due to an adverse event
- Most common adverse events that led to discontinuation were dizziness (1.3%), nausea (1.0%), asthenia, constipation, and headache (each about 0.5%)
- Ranolazine 500 to 1000 mg bid associated with an average ~5 milliseconds increase in the QTc. Clinical experience has not shown an increased risk of proarrhythmia or sudden death

Chaitman BR. Circulation. 2006;113:2462-2472.

Ranolazine Drug Interactions

Inhibitors of CYP3A increase ranolazine plasma levels and QTc prolongation:
- Limit maximum dose to 500 mg twice daily
- Ketoconazole and otherazole antifungals
- Diltiazem
- Verapamil
- Macrolide antibiotics
- HIV protease inhibitors
- Grapefruit juice or grapefruit-containing products

Ranolazine prescribing information. Available at http://www.fda.gov/cder/foi/label/2008/021526s004lbl.pdf
**Optimal Medical Management**

- Antiplatelet therapy
  - Aspirin
  - Clopidogrel (post-ACS/PCI)
- ACEI/ARB
  - LV dysfunction
  - LVH
  - CKD (eGFR<60 mL/min)
- Statin
- Glycemic control (microvascular)
- Blood pressure control
- Beta-blocker
- Nitrates
- Ranolazine

↓ MI  ↓ Heart Failure  ↓ Death
↓ Symptoms  ↑ Exercise

ACEI, angiotensin-converting enzyme inhibitor; CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate; LVH, left ventricular hypertrophy.

**Anti-Ischemic Strategies in Chronic Symptomatic CAD**

- Initial Medical Therapy
  - Persistent Angina or High Risk Features
  - PCI Revascularization CABG
  - Recurrent ischemia
    - T antianginal drug therapy
      (up-titrate/add new agents)
    - Repeat revascularization
      (if possible)

Angiogenic therapy TMR OTHER MEASURES EECP SCS


**EECP Improves Angina Class**

N = 2289 consecutive EECP Clinical Consortium patients

<table>
<thead>
<tr>
<th>Improvement in CCS Angina Class</th>
<th>Patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 1 classes</td>
<td>73.4</td>
</tr>
<tr>
<td>≥ 2 classes</td>
<td>39.5</td>
</tr>
<tr>
<td>≥ 3 classes</td>
<td>22.0</td>
</tr>
</tbody>
</table>

EECP = enhanced external counterpulsation


**Case Study: 65-year-old African American Woman with Persistent Angina**

- New patient
- Semi-retired real estate agent, works periodically
- Chest pain and shortness of breath during modest activity for past 6 months.

**65-year-old African American Woman**

**Less obstructive CAD: Women vs men**

Patients undergoing elective diagnostic angiography for angina

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Patients</th>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40</td>
<td>100</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>40-49</td>
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<td>40</td>
<td>60</td>
</tr>
<tr>
<td>50-59</td>
<td>100</td>
<td>30</td>
<td>70</td>
</tr>
<tr>
<td>60-69</td>
<td>100</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>70-79</td>
<td>100</td>
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<td>90</td>
</tr>
<tr>
<td>&gt;79</td>
<td>100</td>
<td>5</td>
<td>95</td>
</tr>
</tbody>
</table>

65-year-old African American woman

**Medical history**
- Hypertension and hypercholesterolemia
- Post-MI 2 years ago:
  - LVEF by ECHO 48%
  - Angiogram revealed triple-vessel disease with complex lesions not amenable to PCI
- Triple-vessel CABG (mammary to LAD). Chest pain recurred 18 months after:
  - Repeat CABG ruled out from angiogram
  - Prefers medical treatment

**Family history**
- Father: hypercholesterolemia, MI at 64 years

**Social history**
- Smoked 1 pack/day for 25 years, quit 5 years ago
- Occasional glass of wine with dinner (2–3 glasses per week)
- Sedentary lifestyle
- Tries to adhere to recommended diet

65-year-old African American woman

**Current medications (qd)**
- Aspirin 81 mg
- ER metoprolol succinate 50 mg
- Atorvastatin 20 mg
- Lisinopril 40 mg
- Long-acting nitrates Max dose (HA)
- Amlodipine 10 mg

ARS Question #2

After emphasizing diet and exercise (weight loss), what would you do about her medications?
1) Make no Rx changes
2) Increase B-blocker dose (to 100 mg/day)
3) Increase statin dose (to 40 mg/day)
4) Add ranolazine 500 mg bid
5) Other

**Physical exam & laboratory values (no medication)**

<table>
<thead>
<tr>
<th>Physical exam</th>
<th>Laboratory Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP (mm Hg)</td>
<td>LDL-C (mg/dL)</td>
</tr>
<tr>
<td>138/92</td>
<td>116</td>
</tr>
<tr>
<td>HR (bpm)</td>
<td>HDL-C (mg/dL)</td>
</tr>
<tr>
<td>78</td>
<td>46</td>
</tr>
<tr>
<td>HT (in)</td>
<td>Total-C (mg/dL)</td>
</tr>
<tr>
<td>68</td>
<td>146</td>
</tr>
<tr>
<td>WT (lb)</td>
<td>TG (mg/dL)</td>
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<tr>
<td>184</td>
<td>120</td>
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<tr>
<td>BMI (kg/m²)</td>
<td>Creatinine (mg/dL)</td>
</tr>
<tr>
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<tr>
<td></td>
<td>Fasting glucose (mg/dL)</td>
</tr>
<tr>
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<td>103</td>
</tr>
<tr>
<td></td>
<td>A1C (%)</td>
</tr>
<tr>
<td></td>
<td>5.8</td>
</tr>
</tbody>
</table>

Other observations:
No evidence of heart failure in physical exam
ECG: Sinus rhythm, rate 70 bpm, Q waves in inferior leads,
Stress test confirms myocardial ischemia
ECHO: LVEF 48%
Chest X-ray: Normal
ARS Question #3

- B-blocker dose is increased to 100 mg/day and patient returns in 4 weeks complaining of fatigue (heart rate=60 bpm; BP 128/78 mmHg) No improvement in symptoms.

Would you now:
1) Make no further Rx changes
2) Refer for further evaluation
3) Start ranolazine 500 mg bid
4) Recommend EECP or other

Summary

- Chronic angina continues to impose a high socioeconomic burden
- Renewed interest in the role of optimal medical therapy vs PCI (COURAGE)
- Contemporary medical management:
  - Aggressive treatment of multiple risk factors (ABC’s)
  - Multifactorial treatment of symptoms involving both dosage up-titration (BB, CCBs and nitrates) and adding additional agents as necessary to improve the quality of life