MPS + CTA in patient with atypical chest pain

F. Mut, J. Vitola

Nuclear Medicine Service, Asociacion Española
Montevideo, Uruguay
Quanta Diagnostico Nuclear
Curitiba, Brazil
Clinical history

• 59 yo woman, HTN, Dyslipidemia, DM, limited exercise capacity (Framingham: high risk for CAD due to DM).
• Atypical chest pain for the past 6 months.
• Total Cholesterol = 190; HDL = 40; LDL = 88 (on statins).
• Glucose: 0.93, HbA1C = 6.7 % (on insulin + metformin).
What is the probability of CAD by Diamond & Forrester criteria?

a) Very low.
b) Low.
c) Intermediate.
d) High.
What is the probability of CAD by Diamond & Forrester criteria?

a) Very low.
b) Low.

c) Intermediate.
d) High.
### Table A. Pretest Probability of CAD by Age, Gender, and Symptoms*

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Gender</th>
<th>Typical/Definite Angina Pectoris</th>
<th>Atypical/Probable Angina Pectoris</th>
<th>Nonanginal Chest Pain</th>
<th>Asymptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;39</td>
<td>Men</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Very low</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td>40–49</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
<td>Very low</td>
</tr>
<tr>
<td>50–59</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
<td>Low</td>
</tr>
<tr>
<td>&gt;60</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

*High: Greater than 90% pretest probability. Intermediate: Between 10% and 90% pretest probability. Low: Between 5% and 10% pretest probability. Very low: Less than 5% pretest probability. *Modified from the ACC/AHA Exercise Testing Guidelines to reflect all age ranges (14).
Which test can be used to evaluate chest pain in this patient with intermediate probability of CAD by Diamond & Forrest but a high risk of CAD events by Framingham?

a) Treadmill test.
b) MPI using SPECT.
c) Non invasive CT angiography.
d) a, b and c are appropriate options.
Which test can be used to evaluate chest pain in this patient with intermediate probability of CAD by Diamond & Forrest but a high risk of CAD events by Framingham?

a) Treadmill test.

b) MPI using SPECT.

c) Non invasive CT angiography.

d) a, b and c are appropriate options.

- Treadmill test is Class I indication in this setting; MPS is Class I, and CT angiography is Class IIa, while invasive angiography is Class IIb.
Dipyridamole MPS
How do you interpret the MPS findings?

a) Definitely normal
b) Probably normal
c) Definitely abnormal
d) Equivocal
How do you interpret the MPS findings?

a) Definitely normal
b) Probably normal
c) Definitely abnormal
d) Equivocal
What would you do next to define if this patient has CAD?

a) Cardiac MRI.
b) Invasive angiograph.
c) CT angiography.
d) Nothing, she has CAD.
What would you do next to define if this patient has CAD?

a) Cardiac MRI.
b) Invasive angiograph.
c) *CT angiography.*
d) Nothing, she has CAD.

- A second non-invasive imaging procedure is indicated in a patient with low or intermediate risk of CAD when the first method is not conclusive.
**Appropriateness criteria for CTA**

<table>
<thead>
<tr>
<th>Sequential Testing After Stress Imaging Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discordant ECG exercise and imaging results</td>
</tr>
<tr>
<td>Prior stress imaging procedure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Result/Ischemia</th>
<th>A (8)</th>
<th>U (6)</th>
<th>I (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Equivocal</em></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indication</th>
<th>Nonacute Symptoms Possibly Representing an Ischemic Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest Probability of CAD</td>
</tr>
<tr>
<td>1.</td>
<td>ECG interpretable AND Able to exercise</td>
</tr>
<tr>
<td>2.</td>
<td>ECG uninterpretable OR Unable to exercise</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acute Symptoms With Suspicion of ACS (Urgent Presentation)</th>
</tr>
</thead>
</table>

**Source:** Taylor A et al; ACCF/SCCT/ACR/AHA/ASE/ASNC/SCAI/SCMR 2010 Appropriate Use Criteria for Cardiac Computed Tomography. *Circulation published online Oct 25, 2010;*
Coronary CT angiography

- Normal; CAC = 0 Agatston
What is this patient risk of CAD events after functional (MPS) and anatomical (CTA) evaluation?

a) Low risk.
b) Intermediate risk.
c) High risk.
d) Very high risk.
What is this patient risk of CAD events after functional (MPS) and anatomical (CTA) evaluation?

a) Low risk.
b) Intermediate risk.
c) High risk.
d) Very high risk.

- Normal CTA is associated with very low risk of cardiac events due to the high NPV of the method.
- MPS is equivocal but no definite perfusion defects are observed.
Teaching points

- MPS investigates the pathophysiological consequences of luminal obstructive CAD, while CTA indicates the presence, extent and location of coronary atherosclerosis.

- For practical purposes, CTA excludes CAD (high NPV).

- A negative CTA implies no need of MPS on follow-up.

- A positive CTA (if performed initially) implies the need for a MPS for short-term prognosis and eventual revascularization, because of low PPV.

- Combined anatomical and functional assessment may allow improved risk stratification.
Bibliography


