Coronary CTA in the Emergency Room

Ivan Petrovitch, M.D.
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Objective

- Basic epidemiology and pathophysiology of acute coronary syndromes
- Current workup at Stanford in patients with suspected acute coronary syndromes
- Role of coronary CTA in evaluating patients with suspected acute coronary syndromes

Prevalence by age

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Prevalence</th>
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<tbody>
<tr>
<td>20-39</td>
<td>4.1%</td>
</tr>
<tr>
<td>40-59</td>
<td>8.7%</td>
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<tr>
<td>60-79</td>
<td>15.8%</td>
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<tr>
<td>80+</td>
<td>25.0%</td>
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Coronary Heart Disease

- Approximately 785,000 new coronary attacks
- Approximately 470,000 recurrent coronary attacks
- Estimated 195,000 silent coronary attacks

Mortality

1/5 deaths attributable coronary event every 25 seconds
Every minute someone will die of a coronary event

Pathophysiology

Atherosclerosis

- plaque rupture
- thrombus formation
- coronary artery occlusion
Pathophysiology

- Lipid deposition
- Plaque formation
- Luminal narrowing

Atherosclerosis

\[ \text{O}_2 \text{ requirements} > \text{O}_2 \text{ delivery} \]

Angina

ACS - A Spectrum of Disease

Plaque Rupture

- Atherothrombosis (Stable Angina)
- Unstable Angina / NSTEMI
- STEMI

Chest Pain in the ER

- Second most common ER complaint
- 5-8 million ER visits per year
- Wide differential
  - Cardiac
  - GI
  - MSK
  - Pulmonary

Suspected ACS Algorithm

Patient Presents with Chest Pain with suspicion for ACS

- Triage for rapid care
- ASA 160-325 mg chewed
- NTG SL 0.4 mg q5 x3
- MSO4 2-4 mg IV q5-15
- IV access
- Serum Biomarkers
- Continuous ECG monitoring
- Supplemental O\textsubscript{2}
- Focused H&P
- 12 lead ECG

Goal = 10 minutes

STEMI

- Primary PCI / Thrombolysis
- Goal 90 min / 30 min

Indeterminate / Normal

- Repeat ECG & Enzymes
- Continue Supportive Care

NSTEMI / UA

- Evaluate for high-risk features
- Admit to CICU / C-unit
- Cash vs. medical management

25-50\%
• 33 y/o male, low risk factors
• ECG indeterminate
• First serum markers normal

Send Patient Home
• 1.9% of MI is missed
• 4.0% of UA is missed
• Increased M&M
• Most expensive litigation for ER physicians

Admit Patient
• 86% d/c’d without cardiac diagnosis
• $13 billion spent on emergency cardiac workups

Admit to CPU; Now what?
• Continue to monitor serial ECGs and Serum Biomarkers (Class I)
• Stress Testing (Class I)
  - Stress/Rest Sestamibi Scan
  - Echocardiography / Stress Echocardiography
• Coronary CTA (Class IIa)
• Cardiovascular MRI (Class IIa)

CCTA Protocol
(D. Schreiber, M. McConnell, A. Young, G. Rubin)
• Prospective, convenient sample of adults with chest pain / suspected ischemic equivalent
• Non-diagnostic initial ECG and normal initial Tn-I

MDCT  Standard Care

Sens. 100% - Spec. 92%
PPV 87% - NPV 100%
Small Sample Size of 58 Patients

Table 2. Relationship between degree of coronary stenosis on coronary CTA angiography and composite outcome.*

<table>
<thead>
<tr>
<th>Maximal Coronary Stenosis, %</th>
<th>Composite Outcome Present</th>
<th>Composite Outcome Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;90</td>
<td>7</td>
<td>47</td>
</tr>
<tr>
<td>&lt;90</td>
<td>0</td>
<td>508</td>
</tr>
</tbody>
</table>

Sens. 100% - Spec. 91.5%
PPV 13% - NPV 100%

MDCT is effective in excluding disease and confirming extensive disease
  - 75% of cases correctly diagnosed
  - Decreases total costs in ACS workup
    - $1586 vs $1872
Meta-Analysis comprised of over 40 studies and over 2,400 patients
Used a cut-off of > 50% as significant for disease

Sens. 99% - Spec. 89%
PPV 93% - NPV 100%