CARDIOLOGY GRAND ROUNDS

Presentation: ACC 2015 PREVIEW

Date: Monday, March 9, 2015, 7:00 – 8:00 AM

Location: ANW Education Building, Watson Room

Speaker: Elevated Troponin in Patients Presenting to the Emergency Department without Chest Pain
Alex R. Campbell, MD
Cardiologist, Minneapolis Heart Institute® at Abbott Northwestern Hospital

"Silent" Atrial Fibrillation Burden in Patients with Hypertrophic Cardiomyopathy
Ankur Kalra, MD
Chief Cardiology Fellow
Minneapolis Heart Institute® at Abbott Northwestern Hospital and Hennepin County Medical Center

Low Density Lipoprotein Cholesterol, Cardiovascular Risk, and Utilization of Care Prior to ST-Elevation Myocardial Infarction
Michael Miedema, MD, MPH
Cardiologist
Minneapolis Heart Institute® at Abbott Northwestern Hospital

Percutaneous Veno-Arterial ECMO for Patients Presenting with Refractory Cardiogenic Shock Due to STEMI
Yader Sandoval, MD
Cardiovascular Disease Fellow
Minneapolis Heart Institute® at Abbott Northwestern Hospital

Treatment and Outcomes of STEMI Patients Presenting >12 Hours After Onset of Chest Pain
Annie Griffin, BA
Associate Research Coordinator
Minneapolis Heart Institute Foundation
CARDIOLOGY GRAND ROUNDS

OBJECTIVES
At the completion of this activity, the participants should be able to:

1. Summarize emerging research that colleagues will present at upcoming national scientific meeting.
2. Synthesize ideas and input from across disciplines relevant to each presentation.
3. Recommend content revisions or areas of focus to the presenters.

ACCREDITATION

Physicians: This activity has been planned and implemented in accordance with the Essential Areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of Allina Health and Minneapolis Heart Institute Foundation. Allina Health is accredited by the ACCME to provide continuing medical education for physicians. Allina Health designates this live activity for a maximum of 1.0 AMA PRA Category 1 Credit™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Nurses: This activity has been designed to meet the Minnesota Board of Nursing continuing education requirements for 1.2 hours of credit. However, the nurse is responsible for determining whether this activity meets the requirements for acceptable continuing education.

Others: Individuals representing other professional disciplines may submit course materials to their respective professional associations for 1.0 hours of continuing education credit.

DISCLOSURE STATEMENTS

Speaker(s): All presenters have declared that they do not have any conflicts of interest in making these presentations.

Planning Committee: Dr. Michael Miedema, and Eva Zewdie have declared that they do not have any conflicts of interest associated with the planning of this activity. Dr. Robert Schwartz declared the following relationships - stockholder: Cardiomind, Interface Biologics, Aritech, DSI/Transoma, InstyMeds, Intervalve, Medtronic, Osprey Medical, Stout Medical, Tricardia LLC, CoAptus Inc, Augustine Biomedical; scientific advisory board: Abbott Laboratories, Boston Scientific, MEDRAD Inc, Thomas, McNerney & Partners, Cardiomind, Interface Biologics; options: BackBeat Medical, BioHeart, CHF Solutions; speakers bureau: Vital Images; consultant: Edwards LifeSciences.
Elevated Troponin in Patients Presenting to the Emergency Department Without Chest Pain

Alex Campbell, MD, Alex Rodriguez, Scott Sharkey, MD, Ross Garberich MS, David Larson, MD, Craig Strauss, MD

Minneapolis Heart Institute

Background

• Troponin measurement is recommended to detect myocardial necrosis in patients with suspected acute coronary syndromes (ACS)

• Testing is common in patients without suspected ACS

• The outcome and economic impact of troponin testing in this population is unclear
Methods

• Retrospective
• All patients with a Troponin I measurement in the Abbott Northwestern Hospital emergency department during 2013
• Stratified to suspected ACS (ACS +) versus other (ACS -)
  • Definition – ICD codes
    • Chest pain
    • Acute myocardial infarction
    • Angina pectoris
    • Arrhythmia
    • Cardiac arrest
• Compared
• Variables: Clinical characteristics, invasive testing, cost, readmission rate, 30 day mortality
• Detailed chart review subset: Resource utilization, discharge diagnosis, cause of death

At least one Troponin assay (N=9109, 19%)

(ACS +)
(1415, 23%)

(ACS -)
(4722, 77%)

No Detectable Troponin (n=1543; 33%)
Troponin < 99%ile (n=1715; 36%)
Troponin ≥ 99%ile (n=1464; 31.0%)

No Detectable Troponin (n=485; 34%)
Troponin < 99%ile (n=462; 33%)
Troponin ≥ 99%ile (n=468; 33%)

Patients presenting to ANW ED in 2013 (N=47,000)

Admitted to Hospital (n=6137; 67%)

Discharged From ED (n=2972; 33%)

Troponin < 99%ile (n=1715; 36%)
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Patients presenting to ANW ED in 2013 (N=47,000)
### Patient Demographics and Outcomes

<table>
<thead>
<tr>
<th></th>
<th>(ACS +) (n=1415)</th>
<th>(ACS -) (n=4722)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>65</td>
<td>71</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Male (%)</td>
<td>743 (52)</td>
<td>2158 (46)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Angiogram (%)</td>
<td>399 (28)</td>
<td>289 (6)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PCI (%)</td>
<td>244 (17)</td>
<td>90 (2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CABG (%)</td>
<td>17 (1)</td>
<td>13 (0.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>LOS (hours)</td>
<td>32</td>
<td>77</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>TVC (Dollars)</td>
<td>2399</td>
<td>4339</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Readmit within 30 days (%)</td>
<td>208 (15)</td>
<td>1223 (26)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mortality at 30 days (%)</td>
<td>37 (3)</td>
<td>364 (8)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

### Peak Troponin Levels

**Peak cTnl level**

- **Undetectable**
- **Detectable <99%ile**
- **1-2x**
- **2-3x**
- **>3x**

![Peak Troponin Levels Graph](chart.png)
Mortality at 30 Days

Peak cTnI level

* P ≤ 0.003 for all comparisons

Patients presenting to ANW ED in 2013 (N=47,000)

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At least one Troponin assay (N=9109)

Discharged From ED (n=2672; 33%)

Admitted to Hospital (n=6137; 67%)

Detailed Chart Review 10% of Patients (n=469)

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### Patient Demographics in Chart Reviewed Patients

<table>
<thead>
<tr>
<th></th>
<th>Undetectable (n=51)</th>
<th>Detectable &lt;99%ile (n=68)</th>
<th>1-2x (n=130)</th>
<th>2-3x (n=78)</th>
<th>&gt;3x (n=144)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>69</td>
<td>72</td>
<td>76</td>
<td>76</td>
<td>77</td>
<td>0.004</td>
</tr>
<tr>
<td>Female (%)</td>
<td>36 (71)</td>
<td>33 (48)</td>
<td>62 (48)</td>
<td>37 (48)</td>
<td>72 (50)</td>
<td>0.061</td>
</tr>
<tr>
<td>Hx of Heart Disease (%)</td>
<td>15 (29)</td>
<td>34 (50)</td>
<td>96 (74)</td>
<td>87 (73)</td>
<td>99 (69)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Ejection Fraction</td>
<td>63</td>
<td>60</td>
<td>49</td>
<td>50</td>
<td>47</td>
<td>0.003</td>
</tr>
<tr>
<td>GFR &lt; 60 on Admission</td>
<td>12 (23)</td>
<td>31 (46)</td>
<td>86 (66)</td>
<td>55 (70)</td>
<td>96 (67)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>LOS (hours)</td>
<td>51</td>
<td>76</td>
<td>98</td>
<td>93</td>
<td>127</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>TVC, median</td>
<td>$2775</td>
<td>$3904</td>
<td>$4884</td>
<td>$6232</td>
<td>$9022</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

### Resource Utilization and Outcome

<table>
<thead>
<tr>
<th></th>
<th>Undetectable (n=51)</th>
<th>Detectable &lt;99%ile (n=68)</th>
<th>1-2x (n=130)</th>
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<th>&gt;3x (n=144)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiology Consult (%)</td>
<td>8 (16)</td>
<td>16 (23)</td>
<td>48 (37)</td>
<td>36 (46)</td>
<td>85 (59)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Echo performed (%)</td>
<td>14 (27)</td>
<td>22 (32)</td>
<td>65 (50)</td>
<td>39 (50)</td>
<td>110 (76)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Stress test performed (%)</td>
<td>0 (0)</td>
<td>5 (7)</td>
<td>5 (4)</td>
<td>5 (6)</td>
<td>6 (4)</td>
<td>0.30</td>
</tr>
<tr>
<td>Angiogram (%)</td>
<td>0 (0)</td>
<td>2 (3)</td>
<td>8 (6)</td>
<td>4 (5)</td>
<td>25 (17)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PCI (%)</td>
<td>0 (0)</td>
<td>1 (1)</td>
<td>2 (1)</td>
<td>0 (0)</td>
<td>4 (3)</td>
<td>0.63</td>
</tr>
<tr>
<td>CABG (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (1)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0.69</td>
</tr>
<tr>
<td>AMI at discharge (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (1)</td>
<td>0 (0)</td>
<td>11 (7)</td>
<td>0.016</td>
</tr>
<tr>
<td>In-hospital death (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>11 (8)</td>
<td>9 (11)</td>
<td>23 (16)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Death at 30 days (%)</td>
<td>3 (6)</td>
<td>3 (4)</td>
<td>21 (16)</td>
<td>18 (23)</td>
<td>33 (23)</td>
<td>0.001</td>
</tr>
<tr>
<td>Readmit within 30 days (%)</td>
<td>9 (18)</td>
<td>12 (18)</td>
<td>29 (24)</td>
<td>18 (26)</td>
<td>47 (36)</td>
<td>0.030</td>
</tr>
</tbody>
</table>
**Discharge Diagnosis**

- **Non-cardiac (69%)**
  - Infection: 111
  - CNS – Non stroke: 45
  - Respiratory failure: 39
  - GI: 28
  - CNS – Stroke: 22
  - Musculoskeletal: 16
  - Renal failure: 15
  - Metabolic: 11
  - Blood loss: 8
  - Malignancy: 8
  - Pulmonary embolism: 8
  - Drugs / alcohol: 5
  - Medication overdose: 4
  - Genitourinary: 1
  - Hypotension: 1

- **Cardiac (29%)**
  - CHF: 68
  - Atrial fibrillation / flutter: 15
  - Cardiomyopathy: 14
  - Valvular heart disease: 10
  - Cardiac arrest: 7
  - Hypertension: 6
  - NSTEMI: 6
  - STEMI: 5
  - Bradycardia: 3
  - PAD: 3
  - Previous PCI: 2
  - SVT: 2
  - CAD non-revascularized: 2
  - Aortic dissection: 1
  - Other: 3
Cause of Death at 30 Days
Documented severe CAD: 35%

Non-Cardiac 82%

CHF 12%
Valve 3%
ACS 3%

Non-cardiac (58)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection</td>
<td>36</td>
</tr>
<tr>
<td>Cancer</td>
<td>6</td>
</tr>
<tr>
<td>CVA</td>
<td>5</td>
</tr>
<tr>
<td>Renal failure</td>
<td>5</td>
</tr>
<tr>
<td>Natural causes</td>
<td>3</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>1</td>
</tr>
<tr>
<td>COPD</td>
<td>1</td>
</tr>
<tr>
<td>Cirrhosis</td>
<td>1</td>
</tr>
</tbody>
</table>

Hospice: 52

Cardiac (12)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>n</th>
</tr>
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<tbody>
<tr>
<td>CHF</td>
<td>9</td>
</tr>
<tr>
<td>Valvular heart disease</td>
<td>2</td>
</tr>
<tr>
<td>ACS</td>
<td>2</td>
</tr>
</tbody>
</table>

Hospice: 11
Conclusions

• Troponin testing is performed in 20% of ED patients, predominantly in those without suspected ACS

• In patients with troponin elevation, those without suspected ACS differ significantly from those with suspected ACS with respect to clinical characteristics and outcome

• Troponin elevation in patients without ACS identifies a high risk subset with substantial resource utilization and 30 day mortality

• In these patients rates of myocardial infarction, revascularization, and cardiac mortality are low

• The appropriate evaluation and management of this large and important patient subset is unknown