STEWI update

Vijay Krishnamoorthy M.D.

Interventional Cardiology
OVERVIEW

Current Standard of Care in Management of STEMI

Update in management of STEMI

- Pre-Cath Lab – In the ED/Office/EMS.
- Cath Lab
- Post Cath Lab

Future in Myocardial Salvage.
INCIDENCE
CURRENT STEMI MANAGEMENT OVERVIEW

STEMI patient who is a candidate for reperfusion

Initially seen at a PCI-capable hospital

Send to cath lab for primary PCI
FMC-device time ≤90 min
(Class I, LOE: A)

Diagnostic angiogram

Medical therapy only

PCI

CABG

Initially seen at a non-PCI-capable hospital*

DIDO time ≤30 min

Transfer for primary PCI
FMC-device time as soon as possible and ≤120 min
(Class I, LOE: B)

Administer fibrinolytic agent within 30 min of arrival when anticipated FMC-device >120 min
(Class I, LOE: B)

Urgent transfer for PCI for patients with evidence of failed reperfusion or reocclusion
(Class IIa, LOE: B)

Transfer for angiography and revascularization within 3-24 h for other patients as part of an invasive strategy†
(Class IIa, LOE: B)
CASE 1

70 year old man with h/o smoking and not seen a physician for 40 years. Intermittent chest pain for 2 days improved with Tums.

4:30 AM - he woke up with 10/10 chest pain.
1. Radial access is convenient for patient, but in STEMI situation femoral access provides shortest D2B time, thereby improving survival.

2. Crushed Ticagrelor acts faster than any other P2Y$_{12}$ inhibitor.

3. Opening up the Diagonal vessel is the only thing to be done now. The rest of the lesions should be re-evaluated as outpatient.

4. Aspirating the clot results in myocardial salvage and must be done always.
Dual Antiplatelet therapy

Heparin. Absolutely if Lytic therapy used. Otherwise, no data.

2b3a inhibitors
Antiplatelet Therapy – ASA +

• Aspirin: Everyone is given 324mg to chew pre-cath lab.

• **Discharge dose of aspirin – 2 trials**

  • CURRENT OASIS 7 trial 75-100mg aspirin showed similar cardiac benefits, but lower GIB compared to 300-325mg doses.

  • TRANSLATE-ACS - nonrandomized series of 10,123 patients with MI in the United States who underwent percutaneous coronary intervention and were discharged on either 325 or 81 mg of aspirin. Bleeding higher at 6 months for similar cardiac benefit. (24.2 versus 19.5%).
Antiplatelet agents

- Clopidogrel: 600mg loading. Only agent studied with LY Tic therapy.
- Prasugrel: Avoid in Age ≥ 75 yrs, Weight ≤ 60 kg, Prior Stroke or TIA.
- Ticagrelor: Faster onset as not a prodrug. Postulated to have additional beneficial effects via Adenosine release.
- Cangrelor (FDA approved June 2015). Can be given I.V. pre-PCI and thus decreases ST compared to Clopidogrel loading. Practical Use.
In the Cath Lab

• Radial artery access improves survival.

• Culprit Artery Only Vs. Multivessel PCI.

• Aspiration Thrombectomy.
Background

• Bleeding and vascular complications are the most common PCI related complications occurring in up to 10% of PCI cases.

• Bleeding and Blood transfusion are associated with an increased risk for short- and long-term adverse outcomes including recurrent MI, stent thrombosis, and death.

• Importantly, there is a relationship between the acuity of the patient’s presentation and the incidence and site of bleeding.
### RADIAL vs. FEMORAL first approach.

<table>
<thead>
<tr>
<th>Trial</th>
<th>No: of Subjects</th>
<th>Outcome –death, MI, stroke.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIVAL</td>
<td>7021</td>
<td>STEMI Subgroup: Mortality was less (HR 0.60, 95% CI 0.38-0.94)</td>
</tr>
<tr>
<td>MATRIX</td>
<td>8404</td>
<td>Lower in radial group: 8.8 versus 10.3 percent. All cause mortality was ~30% less.</td>
</tr>
</tbody>
</table>
| META-ANALYSIS of MATRIX, RIVAL, RIFLE-STEACS, and STEMI RADIAL. | 19,328          | 1. Non-CABG major bleeding was reduced (risk ratio 0.58, 95% CI 0.46-0.72; p<0.0001).  
2. The risk of death was reduced (risk ratio 0.72, 95% CI 0.60-0.88) |
RADIAL vs. FEMORAL first approach.

<table>
<thead>
<tr>
<th>Study</th>
<th>Total N (Radial N)</th>
<th>Death</th>
<th>Major Bleeding (R vs. F)</th>
<th>Crossover Rate (%) (R vs. F)</th>
<th>D2BT (min) (R vs. F)</th>
<th>Procedure Time (min) (R vs. F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPURA26</td>
<td>149 (77)</td>
<td>4 vs. 6</td>
<td>0 vs. 2</td>
<td>0 vs. 1.5</td>
<td>Not reported</td>
<td>44 vs. 51</td>
</tr>
<tr>
<td>RADIAL-AMI27</td>
<td>50 (25)</td>
<td>0 vs. 1</td>
<td>0 vs. 0</td>
<td>4 vs. 0</td>
<td>Not reported</td>
<td>32 vs. 26</td>
</tr>
<tr>
<td>FARMI28</td>
<td>114 (57)</td>
<td>3 vs. 3</td>
<td>3 vs. 3</td>
<td>12.3 vs. 1.8</td>
<td>Not reported</td>
<td>28 vs. 26</td>
</tr>
<tr>
<td>Li et al.29</td>
<td>370 (184)</td>
<td>Not reported</td>
<td>Not reported</td>
<td>1.6 vs. 1.1</td>
<td>Not reported</td>
<td>56.2 vs 54.8</td>
</tr>
<tr>
<td>Yan et al.30</td>
<td>103 (57)</td>
<td>3 vs. 3</td>
<td>0 vs. 1</td>
<td>1.8 vs. 0</td>
<td>16.2 vs. 15.4</td>
<td>44.1 vs. 41.2</td>
</tr>
<tr>
<td>RADIAMI31</td>
<td>100 (50)</td>
<td>3 vs. 7</td>
<td>2 vs. 2</td>
<td>76.8 vs. 64.6</td>
<td>Not reported</td>
<td>58.3 vs 55.1</td>
</tr>
<tr>
<td>Gan et al.32</td>
<td>195 (90)</td>
<td>2 vs. 3</td>
<td>Not reported</td>
<td>Not reported</td>
<td>29.75 vs 27.89</td>
<td></td>
</tr>
<tr>
<td>Hou et al.33</td>
<td>200 (100)</td>
<td>4 vs. 5</td>
<td>0 vs. 3</td>
<td>4 vs. 0</td>
<td>Not reported</td>
<td>37.2 vs 35.7</td>
</tr>
<tr>
<td>RADIAMI II34</td>
<td>108 (49)</td>
<td>0 vs. 0</td>
<td>4 vs. 6</td>
<td>67.4 vs 57.5</td>
<td>53.7 vs 47.3</td>
<td></td>
</tr>
<tr>
<td>RIVAL14</td>
<td>1958 (955)</td>
<td>12 vs 32</td>
<td>8 vs 9</td>
<td>5.3 vs 1.6</td>
<td>Not reported</td>
<td>35 vs 34</td>
</tr>
<tr>
<td>RIFLE-STEACS12</td>
<td>1001 (500)</td>
<td>26 vs. 46</td>
<td>9 vs. 14</td>
<td>9.6 vs. 2.8</td>
<td>60 vs. 53</td>
<td>Not reported</td>
</tr>
<tr>
<td>MATRIX13</td>
<td>8404 (4197)</td>
<td>66 vs. 91</td>
<td>26 vs. 37</td>
<td>5.7 vs 2.2</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
</tbody>
</table>

Table 3 – Summary of outcomes and time metrics from RCTs comparing transradial and transfemoral primary PCI.
## Culprit Artery Only Vs. Multivessel PCI.

<table>
<thead>
<tr>
<th>2013 Recommendation</th>
<th>2015 Focused Update Recommendation</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class III: Harm</strong></td>
<td><strong>Class IIb</strong></td>
<td></td>
</tr>
<tr>
<td>PCI should not be performed in a noninfarct artery at the time of primary PCI in patients with STEMI who are hemodynamically stable (11-13). (<em>Level of Evidence: B</em>)</td>
<td>PCI of a noninfarct artery may be considered in selected patients with STEMI and multivessel disease who are hemodynamically stable, either at the time of primary PCI or as a planned staged procedure (11-24). (<em>Level of Evidence: B-R</em>)</td>
<td>Modified recommendation (changed class from “III: Harm” to “IIb” and expanded time frame in which multivessel PCI could be performed).</td>
</tr>
</tbody>
</table>
Culprit Artery Only Vs. Multivessel PCI.

• 50% of STEMI patients have multivessel disease.

• The options to treat nonculprit arteries were –
  ➢ At the time of primary PCI of culprit
  ➢ Staged PCI prior to discharge
  ➢ If symptomatic with angina or intermediate to high risk stress test.
4 RCTs favoring treating non-culprit during primary PCI or same admission.

<table>
<thead>
<tr>
<th>Trial</th>
<th>No: of Subjects</th>
<th>Outcome – Primary endpoint of Death, MI, Angina.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRAMI</td>
<td>465</td>
<td>21 (9%) vs. 53 pts (22%)</td>
</tr>
<tr>
<td>CvLPRIT</td>
<td>296</td>
<td>15 (10%) vs. 31 pts (21%)</td>
</tr>
<tr>
<td>DANAMI 3 PRIMULTI</td>
<td>672</td>
<td>40 (13%) vs. 68 (22%)</td>
</tr>
<tr>
<td>PRAGUE-13</td>
<td>214</td>
<td>38 months’ mean follow-up showed no between group differences.</td>
</tr>
</tbody>
</table>
Aspiration Thrombectomy

The 2011 PCI and 2013 STEMI guidelines - Class IIa recommendation for aspiration thrombectomy before primary PCI.

Was driven in large measure by the results of TAPAS (Thrombus Aspiration During Primary Percutaneous Coronary Intervention in Acute Myocardial Infarction Study).

A single-center study, that randomized 1,071 patients with STEMI to aspiration thrombectomy before primary PCI or primary PCI only.
# Aspiration Thrombectomy

<table>
<thead>
<tr>
<th>Trial</th>
<th>No: of Subjects</th>
<th>Outcome – cardiovascular death, recurrent MI, cardiogenic shock, or New York Heart Association class IV heart failure within 180 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAPAS</td>
<td>1,071</td>
<td>0 or 1 Myocardial Blush in 17.1 vs. 26.3%</td>
</tr>
<tr>
<td>INFUSE AMI</td>
<td>452</td>
<td>Proximal and Mid LAD. IC Abciximab. No difference.</td>
</tr>
<tr>
<td>TOTAL</td>
<td>10,732</td>
<td>(347 vs. 351 events) – Similar. Increased incidence of Stroke at 30 and 180 days. (52 vs. 25)</td>
</tr>
<tr>
<td>TASTE</td>
<td>7244</td>
<td>Registry data, no difference.</td>
</tr>
</tbody>
</table>
## Aspiration Thrombectomy

<table>
<thead>
<tr>
<th>2011/2013 Recommendation</th>
<th>2015 Focused Update Recommendations</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
<td><strong>Class IIa</strong></td>
<td><strong>Class IIb</strong></td>
<td>Modified recommendation (Class changed from “IIa” to “IIb” for selective and bailout aspiration thrombectomy before PCI).</td>
</tr>
<tr>
<td>Manual aspiration thrombectomy is reasonable for patients undergoing primary PCI (29-32). <em>(Level of Evidence: B)</em></td>
<td>The usefulness of selective and bailout aspiration thrombectomy in patients undergoing primary PCI is not well established (33-37). <em>(Level of Evidence: C-LD)</em></td>
<td>New recommendation (&quot;Class III: No Benefit&quot; added for routine aspiration thrombectomy before PCI).</td>
</tr>
<tr>
<td><strong>Class III: No Benefit</strong></td>
<td>Routine aspiration thrombectomy before primary PCI is not useful (33-37). <em>(Level of Evidence: A)</em></td>
<td></td>
</tr>
</tbody>
</table>
Ischemia Reperfusion Injury AND Myocardial Salvage.
Necrosis, Autophagy, Apoptosis, Necroptosis. 
Agents and Techniques Studied

Ischemic Preconditioning.

Remote Ischemic Preconditioning

Adenosine, Verpamil, Nipride, Devices to prevent distal embolization.

Cyclosporine A – MPTP inhibitor

Metoprolol – METOCARD, EARLY BAMI, MOVE ON.

Sodium Nitrite infusion - NIAMI

Mitochondrial membrane inhibitors
CASE 2 – 44 yr old male with 2 hours crushing Chest Pain.
CASE 2.
CASE 2
Summary

1. Early Dual Antiplatelet therapy has significant downstream benefits.
2. Radial access reduces bleeding and improves survival in STEMI.
3. Total revascularization is now a Class IIb recommendation.
4. Aspiration Thrombectomy not beneficial in STEMI.
5. Less Bleeding with 81mg aspirin post PCI without compromising cardiovascular benefits.
6. Mechanisms to prevent ischemia reperfusion injury in the works.
UR Medicine

Medicine of the Highest Order