Acute Stroke Interventions
The Role of the Interventional Cardiologist

Amit Segev, MD, FESC, FACC
Interventional Cardiology Unit
Chaim Sheba Medical Center
Disclosures

• I am an interventional cardiologist
• Our Heart Center (6 operators) performs 3500 procedures/year (300 primary PCIs)
• PCI rates are declining
  – Interventional cardiologists need to expand their spectrum of procedures in order to make a living....
• I do at least 6 very active calls /month
  – Do I want more stroke calls?
• What is good for the patient?
Outline

• Brain vs. myocardium

• Demographics

• Data

• Primary PCI

• Skills of interventional cardiologists
Time = Brain
Time = Myocardium
Stroke Intervention: What are we trying to accomplish?

Save the Penumbra

Similar to AMI
Coronary vs. Cerebral Anatomy
Same vessel size
Projected # of strokes in US 2002-2025

Simple Math
900,000 total

88% Ischemic

25-30% Large Vessel Occl
Stroke
Let’s make some calculations

- 900,000 strokes in US
- ~250,000 Interventions will be needed
- 600 Stroke active 24/7/365 neuro-interventionalists
- Many more physicians are needed… Where will they come from??
- 8,000 interventional cardiologists
Dr. Adnan Sidiqqui

- He is a neurosurgeon!!!
- He does percutaneous interventions
- This means that there are not enough radiologists to cover the scope of the problem
- How many cardiac surgeons are doing on call primary PCI? \(\rightarrow\) In Israel = 0
- Why? There are enough interventional cardiologists to cover 24/7 STEMI treatment
Infrastructure for the provision of emergent endovascular care exists

• 1 million PCIs annually in the US
• Over 2,000 cardiac cath labs
• 8,000 interventional cardiologists

• Contemporary cardiac cath labs have DSA & road-mapping

• Acute stroke intervention techniques are similar
  – Clot removal, angioplasty with stenting
  – Interventional cardiologists are experts
A New Era in Stroke

• New RCTs (2015) show convincing evidence that intervention is treatment of choice for large vessel occlusion
  – Canadian 250 pt ESCAPE trial halted by DSMB
  – MrClean trial (Denmark)
  – Swiss and Australian trials

• Significant benefit for intervention
Figure 1. Modified Rankin Scale Scores at 90 Days in the Intention-to-Treat Population.
Endovascular Therapy with Perfusion

### Table 3. Reported Series

<table>
<thead>
<tr>
<th>Event</th>
<th>Common Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>&gt;80 yr</td>
<td>3.0 (1.3–6.8)</td>
</tr>
<tr>
<td>≤80 yr</td>
<td>2.7 (1.7–4.3)</td>
</tr>
<tr>
<td>ASPECTS</td>
<td></td>
</tr>
<tr>
<td>8–10</td>
<td>2.6 (1.7–4.1)</td>
</tr>
<tr>
<td>&lt;8</td>
<td>2.7 (1.0–7.2)</td>
</tr>
<tr>
<td>Cerebral carotid occlusion</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9.6 (2.6–35.5)</td>
</tr>
<tr>
<td>No</td>
<td>2.2 (1.4–3.3)</td>
</tr>
<tr>
<td>IV alteplase</td>
<td></td>
</tr>
<tr>
<td>Received</td>
<td>2.5 (1.6–4.0)</td>
</tr>
<tr>
<td>Not received</td>
<td>2.6 (1.1–5.9)</td>
</tr>
<tr>
<td>NIHSS score at baseline</td>
<td></td>
</tr>
<tr>
<td>6–19</td>
<td>2.6 (1.6–4.2)</td>
</tr>
<tr>
<td>&gt;19</td>
<td>2.4 (1.1–5.3)</td>
</tr>
<tr>
<td>Location of occlusion</td>
<td></td>
</tr>
<tr>
<td>ICA with involvement of the M1 MCA segment</td>
<td>2.6 (1.2–5.9)</td>
</tr>
<tr>
<td>M1 MCA segment or all M2 MCA segments</td>
<td>2.7 (1.7–4.4)</td>
</tr>
<tr>
<td>Time from stroke onset to randomization</td>
<td></td>
</tr>
<tr>
<td>≤180 min</td>
<td>2.6 (1.5–4.5)</td>
</tr>
<tr>
<td>&gt;180 min</td>
<td>2.5 (1.4–4.5)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2.5 (1.4–4.5)</td>
</tr>
<tr>
<td>Female</td>
<td>2.6 (1.5–4.4)</td>
</tr>
</tbody>
</table>

**Figure 2. Subgroup Analyses.**

Primary angioplasty versus intravenous thrombolytic therapy for acute myocardial infarction: a quantitative review of 23 randomised trials

*Ellen C Keeley, Judith A Boura, Cindy L Grines*

- PTCA better
- Thrombolytic therapy better
Good Morning Guys!!!

We have been doing it for over 20 years
ACSIS 2000-2013: STEMI

Mode of Primary Reperfusion

*P for trend <0.0001

<table>
<thead>
<tr>
<th>Year</th>
<th>PPCI</th>
<th>TLx</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>19%</td>
<td>81%</td>
</tr>
<tr>
<td>2002</td>
<td>44%</td>
<td>56%</td>
</tr>
<tr>
<td>2004</td>
<td>68%</td>
<td>32%</td>
</tr>
<tr>
<td>2006</td>
<td>77%</td>
<td>23%</td>
</tr>
<tr>
<td>2008</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td>2010</td>
<td>97%</td>
<td>3%</td>
</tr>
<tr>
<td>2013</td>
<td>98%</td>
<td>2%</td>
</tr>
</tbody>
</table>
30d Mortality Trends 2000-2013

\[ P < 0.0001 \]
30d MACCE
dead/ UAP/ MI/ CVA/ urgent revascularization/ stent thrombosis
2000-2013 Trends

\[ p=0.0001 \]
We will need a STEMI model for stroke mandated door to clot retrieval times
Can Interventional Cardiologists do Neuro-Procedures?

- World-wide, >60% of carotid, renal and peripheral procedures are performed by interventional cardiologists.
CBT treated patients. All cause mortality at 90 days was 8% (2/26). Conclusions: In selected patients, CBT provided by qualified interventional cardiologists supported by stroke neurologists, offers a safe and effective option for patients with acute stroke who are not eligible for intravenous thrombolysis. © 2009 Wiley-Liss, Inc.

Original Studies

Acute Stroke Intervention by Interventional Cardiologists

<table>
<thead>
<tr>
<th>Study</th>
<th>Patients</th>
<th>Age (years)</th>
<th>Male (%)</th>
<th>NIHSS baseline (median)</th>
<th>ICH symptomatic (%)</th>
<th>Mortality at 1–3 Mos (%)</th>
<th>mRankin ≤2 at 90 days (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NINDS</td>
<td>168</td>
<td>69</td>
<td>57</td>
<td>14</td>
<td>6.4</td>
<td>17 at 3 months</td>
<td>39a</td>
</tr>
<tr>
<td>STARS</td>
<td>389</td>
<td>69</td>
<td>55</td>
<td>13</td>
<td>3.3</td>
<td>13 at 1 month</td>
<td>43</td>
</tr>
<tr>
<td>IMS</td>
<td>80</td>
<td>18–80</td>
<td>50</td>
<td>18</td>
<td>6.3</td>
<td>16 at 3 months</td>
<td>43</td>
</tr>
<tr>
<td>IMS II</td>
<td>81</td>
<td>64</td>
<td>57</td>
<td>19</td>
<td>9.9</td>
<td>16 at 3 months</td>
<td>46</td>
</tr>
<tr>
<td>MERCI</td>
<td>151</td>
<td>67</td>
<td>54</td>
<td>20b</td>
<td>7.8</td>
<td>32 at 3 months</td>
<td>46</td>
</tr>
<tr>
<td>Multi-MERCI</td>
<td>164</td>
<td>68</td>
<td>43</td>
<td>19</td>
<td>9.8</td>
<td>34 at 3 months</td>
<td>46</td>
</tr>
<tr>
<td>EMS</td>
<td>17</td>
<td>66</td>
<td>53</td>
<td>16</td>
<td>11.7</td>
<td>29 at 3 months</td>
<td>33a</td>
</tr>
<tr>
<td>PROACT II</td>
<td>121</td>
<td>64</td>
<td>58</td>
<td>17</td>
<td>10</td>
<td>25 at 3 months</td>
<td>40</td>
</tr>
<tr>
<td>OCHSNER</td>
<td>42</td>
<td>64</td>
<td>44</td>
<td>16</td>
<td>12</td>
<td>9.5 at 1 month</td>
<td>45</td>
</tr>
</tbody>
</table>
Predictors of Outcomes Following Catheter-Based Therapy for Acute Stroke

124 patients (mean NIHSS score 15.0 and mean D2B time 4 hr, 17 min) treated at a single center, 2006-2012.

- Stroke Team interventionists (TICs/ICs) were highly 90% effective. Experienced IC participating on a Stroke Team are as effective in delivering of CBT for acute strokes as are neuro-interventionalists and should be utilized to meet the large number of stroke patients who are ineligible for IV-tPA, but may benefit from invasive interventions.

**Implications:** In acute stroke therapy, predictors of a good neurologic outcome are younger age, absence of comorbidities, and successful revascularization.

Guidelines???

European Stroke Organisation (ESO)
European Society for Minimally Invasive Neurological Therapy (ESMINT)
European Society of Neuroradiology (ESNR)

- Mechanical thrombectomy should be performed by a trained and experienced neurointerventionalists who meets national and/or international requirements (Grade B, Level 2b, KSU Grade B) – changed in level of evidence.
Summary (1)

- Stroke physicians should adopt primary PCI programs from cardiologists

- Interventional cardiologists are skilled to perform intra-cranial interventions

- Training programs (not more than 1y) must be created to transfer the appropriate skills to interventional cardiologists for safe and effective acute stroke therapy
Summary (2)

• Very few institutions will ever have enough trained neuro-interventionalists to adequately provide 24/7/365 stroke call coverage

• Acute stroke therapy is and will be forever a team-approached therapy involving stroke non-invasive neurologists and an interventionalist (neuro or cardiologist)

• Political obstructions to the involvement of interventional cardiology by other specialties must be lifted
Summary (3)

• National effort for public awareness of signs of acute stroke and the importance of early presentation

• Multidisciplinary centers of excellence for acute stroke management should operate according to best medical practices for the benefit of patient. Transfer to facilities capable of providing intraarterial therapy would dramatically broaden the applicability of this therapy
The only source of knowledge is experience

- Albert Einstein

Experience

“Learn from the mistakes of others, you can never live long enough to make them all yourself.”

- Groucho Marx
Thank-you