Get organized for in-hospital stroke (jatrogenic or not) acute rescue

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Disclosure

Speaker name: Prof. Luigi Inglese

I have the following potential conflicts of interest to report:

- [ ] Consulting
- [ ] Employment in industry
- [ ] Shareholder in a healthcare company
- [ ] Owner of a healthcare company
- [ ] Other(s)

- [x] I do not have any potential conflict of interest
“Road map”

- Scope of the problem
- Catheter-based therapy (CBT) for stroke
- Updates from the recent literature
- Is there a role for the interventional cardiologist?
- A proposal for a diagnostic and therapeutic strategy
“Road map”

- Scope of the problem
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Incidence of post-procedural stroke


# Melissano G et al. Eur J Vasc Endovasc Surg 2012; 43 (3): 269-75
Stroke incidence after cardiac surgical procedures

- Johns Hopkins Hospital
- 1992-1997 (5.5 year period)
- n = 5971 consecutive adult cardiac surgery patients

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Total Patients</th>
<th>Clinical Stroke</th>
<th>Acute Infarct</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABG</td>
<td>3,974</td>
<td>3.2%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Valve</td>
<td>828</td>
<td>2.8%</td>
<td>1.9%</td>
</tr>
<tr>
<td>CABG/valve</td>
<td>463</td>
<td>6.7%</td>
<td>3.7%</td>
</tr>
<tr>
<td>CABG/CEA</td>
<td>52</td>
<td>17.3%</td>
<td>15.4%</td>
</tr>
<tr>
<td>CABG/other</td>
<td>76</td>
<td>9.2%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Aortic procedures</td>
<td>310</td>
<td>4.2%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Heart transplant</td>
<td>94</td>
<td>1.1%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Other</td>
<td>174</td>
<td>1.1%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Total</td>
<td>5,971</td>
<td>3.6%</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

Cardiac procedures requiring cardiopulmonary bypass (repair of atrial septal defect or left ventricular aneurysm)
Stroke type after cardiac surgery

Embolic cerebral infarction

Watershed (border-zone) cerebral infarction

Right MCA territory infarction

Right MCA-ACA border-zone infarction

Right MCA-ACA-PCA border-zone infarction

Stroke incidence in the catheterization laboratory

- PCI-stroke incidence of 0.37% over a 16-year period (> 24,000 PCI)  
  Mayo Clinic in Rochester, Minnesota  
  Hoffman SJ et al. JACC. Cardiovasc Interv 2011; 4: 415-22

- Two primary mechanisms of PCI-related ischemic stroke have been proposed:
  - Embolization of atheromatous debris from the aorta that can occur during catheter manipulation
  - Hemodynamic insufficiency with or without an associated fixed stenosis of cervical or cerebral arteries

Neuroimaging Patterns of Ischemic Stroke After Percutaneous Coronary Intervention

![Graph showing neuroimaging patterns and vascular territories.]

Successful Endovascular Stroke Rescue With Retrieval of an Embolized Calcium Fragment After Transcatheter Aortic Valve Replacement

CBT: devices

- Suction thrombectomy
- Stent retriever thrombectomy
- Self-expanding stents
- Microwire manipulations
- Snare devices
- Balloon angioplasty
Solitaire ev3

Trevo XP ProVue Retriever
Late data from the literature

• Many called for the end of CBT after the publication of 3 trials in NEJM in 2013
  o IMS III
  o SYNTHESIS
  o MR RESCUE

• These trials concluded that there is **no difference between standard medical therapy and endovascular therapy**
Updates from the recent literature

• This year has seen the publication of 5 major studies evaluating the role of endovascular therapy in stroke treatment
  o MR CLEAN
  o EXTEND-IA
  o ESCAPE
  o SWIFT PRIME
  o REVASCAT

• **ALL 5 trials stopped because of significant benefit in the Endovascular arms**
in-Hospital “stroke rescue” by an interventional team

- 9 randomized trials evaluating pts with large vessel, anterior circulation stroke showed that CBT significantly improved the rate of functional independence when compared to IV fibrinolysis

- Analyses from only the recent trials (reported in 2014-2015) showed further benefit with similar safety results

ESCAPE, EXTEND-IA, SWIFT PRIM, MR CLEAN, REVASCAT
# Randomized Assessment of Rapid Endovascular Treatment of Ischemic Stroke

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention (N = 165)</th>
<th>Control (N = 150)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process times — min</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke onset to randomization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>169</td>
<td>172</td>
</tr>
<tr>
<td>Interquartile range</td>
<td>117–285</td>
<td>119–284</td>
</tr>
<tr>
<td>Stroke onset to study CT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>134</td>
<td>136</td>
</tr>
<tr>
<td>Interquartile range</td>
<td>77–247</td>
<td>76–238</td>
</tr>
<tr>
<td>Stroke onset to start of IV alteplase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>110</td>
<td>125</td>
</tr>
<tr>
<td>Interquartile range</td>
<td>80–142</td>
<td>89–183</td>
</tr>
<tr>
<td>Study CT to groin puncture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Interquartile range</td>
<td>39–68</td>
<td></td>
</tr>
<tr>
<td>Study CT to first reperfusion††</td>
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<tr>
<td>Median</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>Interquartile range</td>
<td>65–115</td>
<td></td>
</tr>
<tr>
<td>Stroke onset to first reperfusion††</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>241</td>
<td></td>
</tr>
<tr>
<td>Interquartile range</td>
<td>176–359</td>
<td></td>
</tr>
<tr>
<td>Treatment with IV alteplase — no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>120 (72.7)</td>
<td>118 (78.7)</td>
</tr>
</tbody>
</table>

Interventional Cardiologists may be part of the multi-disciplinary stroke team?

- CBT of the acute stroke yields better clinical outcomes in patients <65-year-old, with a door-to-balloon time <4 hr and successful reperfusion TICI ≥ 2
- Considering the significant incidence of acute strokes which are either ineligible for intravenous thrombolytic therapy or present too late, CBT may offer an alternative treatment option
- Interventional cardiologists should play an active role in the development of endovascular stroke therapy in a multi-disciplinary team approach
Staff needed for in-Hospital “stroke rescue interventional team”

- **Cardiovascular Cath Lab**
  - 24 hours, 7 days a week (24/7)

- **CT & Neuro-int.radiologist**
  - 24 hours, 7 days a week (24/7)

- **Neurologist**
  - 24 hours, 7 days a week (24/7)
Educational requirements:

• Upgrade the expertise of PCI performers to address intravascular clot retrieval when a neuro-radiology interventional team is not present
Conclusions

- Interventional cardiologists should play an active role in the development of endovascular stroke therapy in a multi-disciplinary team approach.
- Procedures performed by interventional cardiologists and neurointerventionalists yielded comparable recanalization and clinical outcomes rates.
- Endovascular stroke therapy is underutilized because only few hospitals offer a 24/7 neurointervention availability.

In-Hospital “stroke rescue interventional team”
Thank You for your attention