Urgent carotid intervention is safe after thrombolysis for acute stroke

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Disclosures:
DSMB: Lutonix (European trial) 2014 – ongoing
Medtronic (SVS Clinical Seed Grant 2014)

Introduction
- Intravenous thrombolysis with recombinant tissue plasminogen activator (IV tPA) is used to recanalize thrombosed intracranial vessels in 3 to 4.5 hrs post acute stroke.
  - FDA approved: 3h
  - In Comprehensive Stroke Centers in USA: 4.5 hrs (extension of time window)
- However, tPA has a 6% risk of ICH.
- There is scant data whether tPA followed by "urgent" CEA or CAS has an increased risk of complications.

CEA/CAS for symptomatic carotids
Early risk of a recurrent ischemic stroke following an acute neurological event is significant:
- 20% of strokes have antecedent TIA

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CEA for symptomatic carotids and timing of surgery
(meta-analysis of RCTs)

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- 20% of strokes have antecedent TIA

For symptomatic stenosis:
Greatest benefit of CEA is when performed within 2 weeks
- NNT within 2 wks = 5 CEA
- NNT > 12 wks = 125 CEA

Question
- Intravenous thrombolysis with recombinant tissue plasminogen activator (IV tPA) is used to recanalize thrombosed intracranial vessels in 3 to 4.5 hrs post acute stroke.
  - FDA approved: 3h
  - In select stroke centers / Comprehensive Stroke Centers in USA: 4.5 hrs
- However, tPA has a 6% risk of ICH.
- There is scant data whether tPA followed by "urgent" CEA or CAS has an increased risk of complications.

Q: For which patients is this a safe approach?

Del Zoppo et al. Stroke. 2009;40:2945-2948
Wechsler LR. NEJM. 2011;364:2138-2146

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Hypothesis

There is no difference in hemorrhagic risks for an acute carotid intervention following tPA compared to patients who do not receive tPA.

Aim to determine:

- Effects of tPA on complications following uCEA/uCAS (including bleeding)
- Importance of patient selection in outcomes
- Timing and safety of urgent carotid interventions for acute strokes after tPA

PATIENT DEMOGRAPHICS AND BASELINE CHARACTERISTICS

<table>
<thead>
<tr>
<th>Variables</th>
<th>tPA (n=31)</th>
<th>No tPA (n=134)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years (range)</td>
<td>68.9 +11.0</td>
<td>70.3 +11.4</td>
<td>NS</td>
</tr>
<tr>
<td>Sex, male</td>
<td>24/31 (77)</td>
<td>43/134 (58)</td>
<td>NS</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
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<td>49/134 (37)</td>
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</tr>
<tr>
<td>Hypertension</td>
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<td>126/134 (94)</td>
<td>NS</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>21/31 (68)</td>
<td>108/134 (81)</td>
<td>NS</td>
</tr>
<tr>
<td>Tobacco use, ever</td>
<td>21/31 (68)</td>
<td>42/134 (37)</td>
<td>NS</td>
</tr>
<tr>
<td>CAD (%)</td>
<td>8/31 (26)</td>
<td>63/134 (47)</td>
<td>NS</td>
</tr>
<tr>
<td>CRI (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>NS</td>
</tr>
<tr>
<td>Stage I</td>
<td>2 (7)</td>
<td>1 (1)</td>
<td>NS</td>
</tr>
<tr>
<td>Stage II</td>
<td>0 (0)</td>
<td>1 (1)</td>
<td>NS</td>
</tr>
<tr>
<td>Stage III</td>
<td>7/31 (23)</td>
<td>10/134 (8)</td>
<td>NS</td>
</tr>
<tr>
<td>Stage IV</td>
<td>0 (0)</td>
<td>2 (2)</td>
<td>NS</td>
</tr>
<tr>
<td>Stage V</td>
<td>0 (0)</td>
<td>1/134 (1)</td>
<td>NS</td>
</tr>
<tr>
<td>Pre-op use of:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspirin</td>
<td>21/31 (68)</td>
<td>83/134 (62)</td>
<td>NS</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>7/31 (23)</td>
<td>18/134 (29)</td>
<td>NS</td>
</tr>
<tr>
<td>Statin</td>
<td>12/31 (39)</td>
<td>72/134 (54)</td>
<td>NS</td>
</tr>
<tr>
<td>Anticoagulation</td>
<td>0 (0)</td>
<td>7/134 (5)</td>
<td>NS</td>
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</table>

TIA/STROKE SEVERITY FOR EACH GROUP

<table>
<thead>
<tr>
<th>Variables</th>
<th>tPA (n=31)</th>
<th>No tPA (n=134)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIA</td>
<td>0</td>
<td>33</td>
<td>NS</td>
</tr>
<tr>
<td>ABCD2, mean (range)</td>
<td>0</td>
<td>4.5 (2 – 7)</td>
<td>NS</td>
</tr>
<tr>
<td>Stroke</td>
<td>31</td>
<td>101</td>
<td>NS</td>
</tr>
<tr>
<td>NIHSS, mean (range)</td>
<td>6.6 (0 – 19)</td>
<td>6.1 (0 – 26)</td>
<td>NS</td>
</tr>
</tbody>
</table>
Conclusions

• This is a highly selected subgroup of patients (i.e.: patients undergoing ‘urgent’ / ‘expedited’ CEA/CAS)
  Because of Comprehensive Stroke Center:
  \( \text{tPA utilization rate} \)
  - Literature: ~4%
  - Current study: 19%

• uCEA/uCAS can be safely undertaken in minor-to-moderate strokes (NIHSS <10) with low complication rates, including ICH

• Our data supports the practice to not deny a patient an urgent carotid intervention on the basis of tPA administration during the acute stroke period.
Large core infarct in the left posterior MCA territory:
There is no need to do an urgent CEA or CAS.
CT perfusion shows a matched defect with decreased CBF and CBV, typical of core infarct.
Mean transit time is elevated (red/yellow area).
Bottom right, Time to peak is also elevated (red/yellow area).
MRI: infarcted tissue corresponding to the territory on the CT perfusion scan.

Future

Core infarcts/matched perfusion
Ischemic penumbra/mismatched perfusion

Core infarcts/matched perfusion

Ischemic penumbra/mismatched perfusion

An ischemic penumbra is identified in the left hemisphere.
CT perfusion shows a L MCA stroke, but there is a mismatch between CBF and CBV.
Top right, CBF is normal or the same on both hemispheres.
Low CBF in watershed area.
Small watershed infarcts in the L MCA territory corresponding to the territory on the CT perfusion scan.