Carotid Interventions after Ischemic Strokes should be delayed 6-8 weeks only if the Cerebral Lesion is Large (>4000 mm³) on CT

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Disclosure

Nothing to disclose

Methods

Preoperative Cerebral Ischemic Lesion (CIL)

- Preoperative computed tomography (CT)
- Ipsilateral Embolic (Steven's Classification)
- Volume evaluation (mm³ - multi-planar evaluation)

Results

Revascularization outcome

<table>
<thead>
<tr>
<th></th>
<th>Stroke (%)</th>
<th>P</th>
<th>Stroke/Death (%)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4.0</td>
<td></td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>Type of revasc</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEA (327)</td>
<td>3.3</td>
<td>27</td>
<td>3.8</td>
<td>22</td>
</tr>
<tr>
<td>CAS (162)</td>
<td>5.5</td>
<td></td>
<td>5.9</td>
<td></td>
</tr>
<tr>
<td>Timing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤2 weeks (186)</td>
<td>5.3</td>
<td>28</td>
<td>5.9</td>
<td>28</td>
</tr>
<tr>
<td>&gt;2 weeks (303)</td>
<td>3.3</td>
<td>26</td>
<td>3.6</td>
<td>26</td>
</tr>
<tr>
<td>CIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive (251)</td>
<td>4.8</td>
<td>47</td>
<td>5.6</td>
<td>26</td>
</tr>
<tr>
<td>Negative (238)</td>
<td>3.5</td>
<td></td>
<td>3.5</td>
<td></td>
</tr>
</tbody>
</table>

CIL volume evaluation

Total median = 1000 mm³ (IQR 7000mm³)

Results

No events

Postop stroke

P=.01
Results

CIL volume evaluation

Differential CIL volume and postoperative outcomes:
- No events: 1000 (IQR 7000)
- Postop stroke/death: 4500 (IQR 17540)

P = .03

CIL volume vs. stroke

OR: 5.1
95% CI: 1.3-19.5

P = .01

Multivariate analysis for risk of stroke

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>OR</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.0</td>
<td>0.9-1.1</td>
<td>.52</td>
</tr>
<tr>
<td>Gender, male</td>
<td>0.5</td>
<td>0.1-2.2</td>
<td>.43</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>0.4</td>
<td>0.1-2.0</td>
<td>.28</td>
</tr>
<tr>
<td>Contralateral carotid occlusion</td>
<td>0.9</td>
<td>0.1-7.7</td>
<td>.89</td>
</tr>
<tr>
<td>Timing of revascularization</td>
<td>1.2</td>
<td>0.3-4.4</td>
<td>.72</td>
</tr>
<tr>
<td>Type of revascularization</td>
<td>0.9</td>
<td>0.3-3.3</td>
<td>.89</td>
</tr>
<tr>
<td>CIL Volume &gt; 4000 mm³</td>
<td>4.6</td>
<td>1.3-19.1</td>
<td>.03</td>
</tr>
</tbody>
</table>

Conclusions

- The presence of CIL has no overall effect on CEA/CAS outcome.
- However, if CIL volume is >4000 mm³, the risk of stroke is significantly increased.

The benefit of deferred carotid revascularization in patients with moderate disabling stroke

R. Pini, G Faggioli, A Vacirca, E Gallitto, C Mascoli, M Dieng, M Gargiulo, A Stella

Presented at the 2018 ESVS annual meeting (Valencia, E)
Study endpoint

- Perioperative 30-day stroke/death after CEA in patients with large cerebral ischemic lesion
- Investigate the best timing to reduce the post-op complication rate

Patients selection

- 4020 CEA (11 year period)
- 1087 symptomatic
- 2933 (27%) asymptomatic
- 126 (11.6%) moderate disabling stroke and large ischemic lesion

Patients characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total 126</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carotid artery stenosis %</td>
<td>80 (IQR:15)</td>
</tr>
<tr>
<td>Contralateral carotid stenosis %</td>
<td>50 (IQR: 60)</td>
</tr>
<tr>
<td>Contralateral carotid occlusion</td>
<td>15 (12%)</td>
</tr>
<tr>
<td>Volume of ischemic cerebral lesion</td>
<td>20650 (IQR: 47711)</td>
</tr>
<tr>
<td>mRS</td>
<td>3 (IQR:1)</td>
</tr>
</tbody>
</table>

Perioperative outcome

- Time from symptom to CEA: mean 7 weeks; (median 2)
- mRS did not changed significantly from initial symptom at the time of CEA 3 (IQR:1) vs 3 (IQR:1)

<table>
<thead>
<tr>
<th>Perioperative outcome</th>
<th>Early CEA</th>
<th>Delayed CEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke*</td>
<td>8 (6.3%)</td>
<td></td>
</tr>
<tr>
<td>Death‡</td>
<td>1 (0.8%)</td>
<td></td>
</tr>
<tr>
<td>Stroke/Death</td>
<td>9 (7.1%)</td>
<td></td>
</tr>
</tbody>
</table>

* Hemorragic conversion
† Neurological deterioration
‡ New symptoms CT +
CEA < or > 4 weeks

### Clinical characteristics

<table>
<thead>
<tr>
<th></th>
<th>≤ 4 weeks</th>
<th>&gt; 4 weeks</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt; 80 years</td>
<td>10 (15%)</td>
<td>9 (12%)</td>
<td>.65</td>
</tr>
<tr>
<td>Male</td>
<td>46 (68%)</td>
<td>45 (76%)</td>
<td>.32</td>
</tr>
<tr>
<td>Hypertension</td>
<td>61 (94%)</td>
<td>57 (97%)</td>
<td>.38</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>42 (65%)</td>
<td>49 (83%)</td>
<td>.01</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>16 (25%)</td>
<td>19 (32%)</td>
<td>.23</td>
</tr>
<tr>
<td>Stroke</td>
<td>14 (22%)</td>
<td>15 (25%)</td>
<td>.38</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>19 (29%)</td>
<td>18 (31%)</td>
<td>.51</td>
</tr>
<tr>
<td>COPD</td>
<td>9 (14%)</td>
<td>5 (9%)</td>
<td>.25</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>3 (5%)</td>
<td>3 (5%)</td>
<td>.59</td>
</tr>
<tr>
<td>Carotid artery stenosis%</td>
<td>80 (IQR: 15)</td>
<td>80 (IQR: 20)</td>
<td>.81</td>
</tr>
</tbody>
</table>

### Neurol. characteristics

<table>
<thead>
<tr>
<th></th>
<th>≤ 4 weeks</th>
<th>&gt; 4 weeks</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carotid artery stenosis %</td>
<td>80 (IQR: 15)</td>
<td>80 (IQR: 20)</td>
<td>.81</td>
</tr>
<tr>
<td>Contralateral carotid stenosis %</td>
<td>45 (IQR: 56)</td>
<td>50 (IQR: 70)</td>
<td>.94</td>
</tr>
<tr>
<td>Contralateral carotid occlusion</td>
<td>7 (12%)</td>
<td>8 (13%)</td>
<td>.59</td>
</tr>
<tr>
<td>Volume of ischemic cerebral lesion</td>
<td>22297 (44727)</td>
<td>20502 (52688)</td>
<td>.83</td>
</tr>
<tr>
<td>mRS</td>
<td>1 (IQR: 1)</td>
<td>1 (IQR: 1)</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**Take home message**

1. CEA after a disabling stroke (mRS > 3) has a high risk of postoperative MAE

(7.1% in our series and up to 26% in the literature)

Rantner et al. J Stroke Cer Vasc Dis 2006
Wolfle et al Vasa 2004

In patients with large cerebral lesions (>4000 mm³), a better outcome is obtained after > 4 weeks from symptoms