Not So: Early CEA After Symptom Onset has a Higher Risk of Adverse Events (Death/Stroke) Than Delayed Operation: How Long Should CEA Be Delayed

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I have no relevant financial relationships to disclose at this time

My Opponent

Few shortcomings

Key words in the debate plank are… < 2 weeks of the first symptom…

- Is early or acute truly < 2 weeks?
- Do/can all patients be seen within a day or 2 of their neurologic event?
- How good are we at predicting which specific symptomatic patient is at risk of recurrent neurologic event?
- If the time between first symptom, referral, hospital admission and operation exceeds 14 days, the early risk of stroke already has passed and may explain the good results of ‘early CEA’

Critical Issues in Framing the Debate

- Not all symptomatic patients behave the same or have equal risk of stroke
- Etiology and severity of stroke, lesion, and medical comorbidities affect risk
- Current best medical therapy has impacted recurrent neurologic events
- Systems to facilitate and expedite evaluation and treatment be duplicated
- Applicability to the broad practice?

Procedural Adverse Events in Patients Subdivided According to Time to Intervention

<table>
<thead>
<tr>
<th>Time to Intervention</th>
<th>No. (%)</th>
<th>0-2 Days</th>
<th>3-7 Days</th>
<th>8-14 Days</th>
<th>15-180 Days</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor stroke</td>
<td>10 (6.8)</td>
<td>10 (1.2)</td>
<td>13 (1.9)</td>
<td>23 (2.4)</td>
<td>56 (2.2)</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Major stroke</td>
<td>6 (4.1)</td>
<td>10 (1.2)</td>
<td>10 (1.5)</td>
<td>16 (1.7)</td>
<td>42 (1.6)</td>
<td>.097</td>
<td></td>
</tr>
<tr>
<td>Mortality</td>
<td>3 (2.0)</td>
<td>10 (1.2)</td>
<td>7 (1.0)</td>
<td>16 (1.7)</td>
<td>36 (1.4)</td>
<td>.640</td>
<td></td>
</tr>
<tr>
<td>Mortality and any stroke</td>
<td>17 (11.5)</td>
<td>20 (3.6)</td>
<td>27 (4.0)</td>
<td>52 (8.4)</td>
<td>125 (4.8)</td>
<td>&lt;.001</td>
<td></td>
</tr>
</tbody>
</table>

Comparison of Timing of Surgery, Radiologic Findings, and Outcomes of 90 Urgently Operated Patients by Presentation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total (n = 90)</th>
<th>TIA (n = 27)</th>
<th>Stroke (n = 52)</th>
<th>SIE (n = 11)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timing of surgery (hrs)</td>
<td>47.5 (17-113)</td>
<td>29 (18-95)</td>
<td>48.5 (16-117)</td>
<td>53 (17-168)</td>
<td>.7</td>
</tr>
<tr>
<td>Ischemic lesion CT/MRI</td>
<td>27 (30.0)</td>
<td>0</td>
<td>24 (46.1)</td>
<td>3 (27.3)</td>
<td></td>
</tr>
<tr>
<td>New ischemic lesion CT</td>
<td>35 (38.9)</td>
<td>0</td>
<td>27 (51.9)</td>
<td>8 (72.7)</td>
<td></td>
</tr>
<tr>
<td>Hemorrhagic lesion CT</td>
<td>1 (1.1)</td>
<td>0</td>
<td>1 (1.5)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

30-day outcomes

- Stroke: Total 6 (6.6), TIA 0 (0), Stroke 3 (5.8), SIE 3 (27.3), P = .008
- Mortality: Total 4 (4.4), TIA 0 (0), Stroke 1 (1.9), SIE 2 (18.2), P = .05
- Stroke / mortality: Total 10 (11.1), TIA 1 (3.4), Stroke 3 (5.8), SIE 8 (72.7), P = .03


Prediction of Early Stroke Risk After Suffering a TIA: The ABCD2 Scoring System

- **Score**
  - A Age > 60
  - B Blood pressure Systolic > 140 mmHg or Diastolic > 90 mmHg
  - C Clinical features Unilateral weakness
  - D Duration of TIA > 60 minutes
  - E Diabetes

- **Risk of Stroke**
  - ABCD2 Score 0-3: No. 2-day, % 7-day, % 90-day, %
  - 0-3: 1628, 1.0, 1.2, 3.1
  - 4-5: 2169, 4.1, 5.9, 9.8
  - 6-7: 1012, 8.1, 11.7, 17.8

*Data from Johnston, as modified by Naylor/AbuRahma J Vasc Surg 2015;61(6):1642-51

- California and ABCD scores validated from 4 independent groups of pts with TIA from USA and UK
- Defined risk scores of stroke at 2, 7, 30 and 90 days with c statistics
- ABCD2 score > 4 predicts higher stroke risk at 2, 7, 30, and 90 days
- A policy to admit pts with moderate or greater risk of stroke reduced out of hospital strokes to only 9%

Lancet 2007;369:283-292

Validation and refinement of scores to predict very early stroke risk after transient ischaemic attack

- Index symptom defined as the clinical event that led the patient to seek medical advice and referral to the TIA clinic
- Median delay from index symptom to surgery 8 days

Objective: to identify the reasons for delay before CEA in a ‘fast track’ system designed for urgent operation
- 89 patients audited
- 4809 patients
- 58% CEAs > 14 days

Lancet 2007;369:283-292

Incidence of Recurrent Events before and after Best Medical Treatment

- Incidence of Recurrent Events before and after Best Medical Treatment
- TIA (p<0.001)
- Stroke (p<0.001)
- Stroke Plus (p<0.001)
- Total (p<0.001)

*Data from: Stroke. 2013;44:2220-2225

Objective: to identify the reasons for delay before CEA in a ‘fast track’ system designed for urgent operation
- 89 patients audited
- Delay Prior to Expedited Carotid Endarterectomy: A Prospective Audit of Practice
Risk of Early Recurrent Stroke in Symptomatic Carotid Stenosis

<table>
<thead>
<tr>
<th>No. (%)</th>
<th>Total</th>
<th>Stenosis ≥80%</th>
<th>Contralateral stenosis ≥70%</th>
<th>Amaurosis</th>
<th>TIA</th>
<th>Minor stroke</th>
<th>2010 – 2012</th>
<th>2004 – 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>397</td>
<td>23 (5.8)</td>
<td>281 (70.8)</td>
<td>69 (17.4)</td>
<td>70 (17.6)</td>
<td>145 (36.5)</td>
<td>182 (45.8)</td>
<td>203 (51.1)</td>
<td>194 (48.9)</td>
</tr>
<tr>
<td>237 (94.2)</td>
<td>261 (92.5)</td>
<td>86 (79.0)</td>
<td>30 (42.9)</td>
<td>91 (63.9)</td>
<td>113 (75.0)</td>
<td>114 (63.0)</td>
<td>111 (59.8)</td>
<td>120 (62.2)</td>
</tr>
</tbody>
</table>

P = .964

Stenosis >80%

Contralateral stenosis ≥70%

Amaurosis

TIA

Minor stroke

Conclusion: The data suggest that the early total recurrent risk in symptomatic high-grade carotid stenosis is not as high as that earlier studies have shown. The risk is similar to several studies if neither a medical treatment regime could be initiated.

Waiting Times in the Referral Pathway

<table>
<thead>
<tr>
<th>Interval</th>
<th>Pts. (No.)</th>
<th>Median days (IQR)</th>
<th>90th percentile days</th>
<th>Mean days (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIA to surgery</td>
<td>92</td>
<td>27 (24-31)</td>
<td>113 (92-134)</td>
<td>25.7 (23.2-28.2)</td>
</tr>
<tr>
<td>TIA to vascular referral</td>
<td>88</td>
<td>14 (12-17)</td>
<td>56 (39-73)</td>
<td>11.7 (10.8-12.6)</td>
</tr>
<tr>
<td>Vascular referral to vascular consult</td>
<td>81</td>
<td>10 (8-13)</td>
<td>19.7 (15.8-24.5)</td>
<td></td>
</tr>
<tr>
<td>Vascular consult to decision for CEA</td>
<td>92</td>
<td>0 (0-0)</td>
<td>11.9 (5.0-18.8)</td>
<td></td>
</tr>
<tr>
<td>Surgical wait time</td>
<td>92</td>
<td>14 (8-25)</td>
<td>25.7 (15.2-36.2)</td>
<td></td>
</tr>
</tbody>
</table>

TIA to surgery: 92; median = 27 (IQR 24-31); 90th percentile = 113 (92-134); mean = 25.7 (95% CI 23.2-28.2).

TIA to vascular referral: 88; median = 14 (IQR 12-17); 90th percentile = 56 (39-73); mean = 11.7 (95% CI 10.8-12.6).

Vascular referral to vascular consult: 81; median = 10 (IQR 8-13); 90th percentile = 19.7 (15.8-24.5).

Vascular consult to decision for CEA: 92; median = 0 (IQR 0-0); 90th percentile = 11.9 (5.0-18.8).

Surgical wait time: 92; median = 14 (8-25); 90th percentile = 25.7 (15.2-36.2).

Summary

- Outcomes from ‘early’ CEA for symptoms dependent on multiple variables
- Not every clinical presentation imparts a good outcome with early operation
- Patient selection is critical
- Replication of excellent results in real world practice is difficult

Procedural Risk Following Carotid Endarterectomy in the Hyperscrape Period after Onset of Symptoms

- Retrospective audit of 475 Sx pts 2008-2013
- Best med Tx dual antiplatelets/ statin
- ABCD² score 0-3 seen within 7 days; score of 4-7 seen same day or next morning
- Patients with disabling stroke and no improvement had surgery delayed 2-4 weeks; those with early improvement operated sooner
- While no increase in procedural risk was noted for patients operated at various times within 14 days, 28% patients were operated later