DEBATE: Patch Closure after CEA Should be Used Most of the Time: Level 1 Evidence Shows It

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• Speaker Disclosure: Nothing to Disclose

Background

• CEA closure has been controversial over past few decades
• However, most authorities tilted towards CEA with patch closure over past 2 decades: 1990’s and 2000-2010

• Most authorities agree on patching of:
  – Small carotid arteries (≤4 mm) – may avoid restenosis
  – Lateral tears at the apex of ICA – may avoid narrowing of arteriotomy
  – Excessive thickening of intima of distal ICA – can smooth transition zone
  – Kinked or elongated arteries – helps maintain lumen & prevents postop. occlusion
  – Redo CEA
  – Patching may decrease chance of technical errors
Opponents of Patching

- Prolonged op. time/shunt & clamp time & hemostasis time
- Potential patch infection
- Potential patch disruption  <1%

CEA Closure: Primary vs. Patching

Several Randomized Trials:
- Eikelboom et al, JVS, 1988
- Lord et al, JVS, 1989
- Ranaboldo et al, BJJS, 1993
- Katz et al, JVS, 1994
- AbuRahma et al, JVS, 1996
- AbuRahma et al, JVS, 1998
- AbuRahma et al, Stroke, 1999
- AbuRahma et al, JVS, 2002
- AbuRahma, et al, JVS, 2005

Summary Estimates from Meta-Analysis Outcomes from 7 Trials Comparing CEA/Patch vs PC

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Patch Closure</th>
<th>Primary Closure</th>
<th>Ratio</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>0.1</td>
<td>1</td>
<td>0.1</td>
<td>P=0.04</td>
</tr>
<tr>
<td>Failure</td>
<td>1/100 (0.1)</td>
<td>1/100 (0.1)</td>
<td>1</td>
<td>P=0.9</td>
</tr>
<tr>
<td>Any Events</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>P=0.4</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>P=0.9</td>
</tr>
<tr>
<td>Access Site</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>P=0.4</td>
</tr>
<tr>
<td>Access Site</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>P=0.4</td>
</tr>
<tr>
<td>Infection</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>P=0.9</td>
</tr>
<tr>
<td>Carotid Injury</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>P=0.9</td>
</tr>
</tbody>
</table>
**Periop. (30-Day) Outcome in 10 Randomized Controlled CEA Trials**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Patch Closure Event/Cases</th>
<th>Primary Closure Event/Cases</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ipsilateral stroke</td>
<td>10/1061 (1.5)</td>
<td>23/514 (4.5)</td>
<td>0.31</td>
</tr>
<tr>
<td>All death</td>
<td>5/1061 (0.5)</td>
<td>6/883 (0.7)</td>
<td>0.62</td>
</tr>
<tr>
<td>Fatal stroke</td>
<td>1/783 (0.1)</td>
<td>2/658 (0.3)</td>
<td>0.47</td>
</tr>
<tr>
<td>Any stroke</td>
<td>8/1061 (1.7)</td>
<td>27/883 (3.2)</td>
<td>0.57</td>
</tr>
<tr>
<td>Stroke or death</td>
<td>8/1061 (1.7)</td>
<td>31/883 (3.7)</td>
<td>0.58</td>
</tr>
<tr>
<td>Return to OR</td>
<td>8/731 (1.1)</td>
<td>17/550 (3.1)</td>
<td>0.35</td>
</tr>
<tr>
<td>Arterial occ.</td>
<td>4/794 (0.5)</td>
<td>20/641 (3.1)</td>
<td>0.18</td>
</tr>
<tr>
<td>Car. nerve injury</td>
<td>13/981 (2.2)</td>
<td>14/466 (3.0)</td>
<td>0.78</td>
</tr>
</tbody>
</table>

(Rerkasem & Rothwell, Stroke, 2010)

**Long-Term Outcome in 10 Randomized Controlled CEA Trials**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Patch Closure Event/Cases</th>
<th>Primary Closure Event/Cases</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ipsilateral stroke</td>
<td>10/1041 (1.6)</td>
<td>24/500 (4.8)</td>
<td>0.32</td>
</tr>
<tr>
<td>All death</td>
<td>79/723 (9.7)</td>
<td>73/609 (12.0)</td>
<td>0.78</td>
</tr>
<tr>
<td>Fatal stroke</td>
<td>1/577 (0.2)</td>
<td>4/442 (0.9)</td>
<td>0.27</td>
</tr>
<tr>
<td>Any stroke</td>
<td>17/723 (2.4)</td>
<td>28/609 (4.6)</td>
<td>0.49</td>
</tr>
<tr>
<td>Stroke or death</td>
<td>75/577 (13)</td>
<td>91/442 (20.6)</td>
<td>0.59</td>
</tr>
<tr>
<td>Restenosis</td>
<td>41/921 (4.3)</td>
<td>110/798 (13.8)</td>
<td>0.24</td>
</tr>
</tbody>
</table>

(Rerkasem & Rothwell, Stroke, 2010)

**One Randomized Study Supported Primary Closure**

- All done by single surgeon
- 1ry closure using operating microscope
- Used Dacron patch: ? Type
- 153 patching vs. 175 1ry closure
- 30-d stroke rate was similar: 2.9% vs. 3.9%
- Study was stopped on basis of futility
- Follow-up was only 12 mos.
- Concluded: both are equivalent


**Prospective Randomized Trial of Bilateral CEAs: 1ry Closure vs. Patching**

- 74 pts.: bilat. sequential CEA
- Randomized to either patching/1ry or 1ry/patching
- Each pt. was their own control
- Ipsilateral stroke: 1ry – 4%, patching – 0%, ipsilateral TIA/stroke – 1% (p=0.02)
- Late mean follow-up of 29 mos.:
  - ≥80% restenosis: 1ry – 22%, patching – 1% (p<0.003)
  - Carotid occ: 0% vs. 8% (p=0.04)

(Al-Rahi et al, Stroke, 1999)

**Advantages of CEA/Patching**

- ↓ Periop. carotid thrombosis
- ↓ Periop. stroke
- ↓ Late restenosis

**Updated SVS Guidelines for Management of Extracranial Carotid Disease: Executive Summary**

- Patch angioplasty or eversion endarterectomy is recommended over primary closure to reduce early & late complications of CEA
  (Grade 1, level of evidence A)

(J Ricotta & A AbuRahma, JVS, 2011)
Conclusions

- Some vascular surgeons still don’t use carotid patching routinely
- However, there is Level I evidence to support a Grade A recommendation for routine carotid patching
- There is Grade D recommendation to support primary closure in a large ICA (>6 mm)