Carotid Artery Aneurysms:
Is open surgery the best treatment for most: when are endovascular techniques indicated?

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Disclosures

• Nothing to disclose

ECAAs

• Rare entity relative to simple atherosclerotic disease of the carotid bifurcation
• Extracranial carotid artery aneurysms represent 0.1-2% of carotid interventions

ECAAs

• Largest review of ECAAs: El Sabrout from Texas Heart JVS 2000
• Data from 14 Largest Single-Center Experiences Since 1950
• Total Number of Carotid Procedures 17,854
• Cases of ECAA 434 (2.4%)
• Indications
  • Atherosclerotic or Degenerative 42
  • Pseudoaneurysm 21
  • Trauma 16
  • Dissection 10
  • FMD 7
  • Infection 2
  • Other 3

Natural History

• Neurologic
  • Embolization
  • Occlusion
  • TIA or Stroke
  • Nerve Compression
  • Erosion into airway
  • Rupture

Natural History
Natural History

Open Repair

A. Open methods:
• resection with primary anastomosis
• autogenous vein interposition
• synthetic graft interposition
B. Complications:
• cranial nerve damage: 6-26%
• mortality/major stroke: 10%

Open Repair

Before Repair

Interposition Vein Bypass

Open Repair

Before Repair

PTFE graft interposition repair

Open Repair

Aneurysm sac

Ulcerations

Intraluminal Thrombus

Source of Embolization

Endovascular Repair

A. Endovascular methods:
• covered stent-graft
• bare metal stent with and without trans-stent coiling
B. Complications:
• cranial nerve damage: 6%
• major mortality/stroke: 2-5%
• endoleak: 8.1%

Zhou et al. 2007, Li et al. 2011
## Endovascular Repair

**Rutherford's Vascular Surgery 8th Ed**

### Limitations

**Endovascular**
- Mycotic/infected aneurysm
- Tortuous arteries
- Unstable thrombus

**Open**
- Hostile anatomy
- Higher levels of anesthesia
- Large/distal aneurysm on ICA

### Open Repair

**Combined Stroke and Death Rate**

<table>
<thead>
<tr>
<th>Series</th>
<th>Stroke/Death (%)</th>
<th>Cranial nerve dysfunction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bower et al.</td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>Walling et al.</td>
<td>9.5</td>
<td>-</td>
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<tr>
<td>McCalman et al.</td>
<td>12.5</td>
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<td>Zondek et al.</td>
<td>5.6</td>
<td>22</td>
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<td>Rhodes et al.</td>
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<td>Prasad et al.</td>
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<tr>
<td>Koppes et al.</td>
<td>13</td>
<td>15</td>
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<tr>
<td>El-Sabrout &amp; Cooley</td>
<td>9</td>
<td>6</td>
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<tr>
<td>Moreau et al.</td>
<td>3</td>
<td>86</td>
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<td>Faggioni et al.</td>
<td>8</td>
<td>21</td>
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<tr>
<td>Soucht et al.</td>
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<td>26</td>
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<tr>
<td>Schwab et al.</td>
<td>12</td>
<td>55</td>
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<tr>
<td>Pulli et al.</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Zhou et al.</td>
<td>14</td>
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<tr>
<td><strong>Overall</strong></td>
<td><strong>9.8</strong></td>
<td><strong>17.8</strong></td>
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**Stroke/Death Rate**

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<td>4.1</td>
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<tr>
<td>Zhou et al.</td>
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<td>5</td>
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<tr>
<td>Saeedi et al.</td>
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<td>0</td>
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<tr>
<td>Cobbeil et al.</td>
<td>0</td>
<td>0</td>
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<tr>
<td><strong>Overall</strong></td>
<td><strong>2.3</strong></td>
<td><strong>1.4</strong></td>
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</tbody>
</table>

**Factors favoring endovascular approach**
- High carotid bifurcation
- High clinical risk for open surgery
- Hostile Neck

**Answer:** It Depends...

Open surgery is safe, effective and probably best treatment for most...

Is open surgery the best treatment for most when are endovascular techniques indicated?

**Open Surgery v. Endovascular**

- Low stroke and death rates
- Less cranial nerve dysfunction – most resolve
- Small series

**Combined Stroke and Death Rate**

- 21% non-operatively
- 12% carotid ligation
- 9% surgical reconstruction
Open Surgery v. Endovascular

- Covered stents have a lower risk of endoleak
- Decreased re-intervention rate
- Decreased stent-graft restenosis
- Increased risk of aneurysm sac thrombosis
- Mycotic aneurysms probably a contraindication

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