WE CAN (AND SHOULD) CHOOSE PATIENTS FOR ASYMPTOMATIC CAROTID STENOSIS TREATMENT BASED ON SURVIVAL PREDICTIONS

ASYMPTOMATIC CAROTID STENOSIS TREATMENT BASED ON SURVIVAL PREDICTION

DISCLOSURES

- INDIVIDUAL
  None
- INSTITUTIONAL
  Cook, Inc
- Not discussing off label anything

A patient with an asymptomatic 90% carotid stenosis should not undergo intervention unless his/her life expectancy is

1. 1 year or more
2. 2 years or more
3. 5 years or more
An 82-year old patient with a 90% left carotid stenosis is referred to you. He underwent CABG 6 years ago and is asymptomatic. He no longer smokes. He does not take a statin because he developed muscle pain. His Cr is 1.6 mg/dl. He is not diabetic. He plays golf twice a week and either walks a mile or swims for 30 minutes on days he does not play golf. He just returned from a golf vacation in Scotland.

1. CEA
2. CAS
3. BMT

DEcision Analysis

Stroke risk
- Symptom status
- Degree of stenosis
- Plaque morphology
- Stenosis progression

Treatment benefit
- Long-term survival

Treatment Recommendations

CEA should be considered for asymptomatic stenosis of 60-99% because it lowers risk of stroke by a small but statistically significant amount (LEVEL 1)

CEA is of benefit only if it can be performed with a complication rate of ≤3% (LEVEL 1)

CEA primarily benefits men and those with a life expectancy of ≥5 years (LEVEL 1)

CAS may be considered as an alternative to CEA if CEA would present special difficulties and CAS can be performed with a complication rate ≤3% (LEVEL 2b)

Controversies

Studies not optimally designed
- Degree of stenosis
- Definition of asymptomatic
- Definition of primary endpoints

Best medical therapy then ≠ best medical therapy now

Change in treatment options (CAS) affects the risk/benefit balance
**TREATMENT RECOMMENDATIONS**

CEA should be considered for asymptomatic stenosis of 60-99% because it lowers risk of stroke by a small but statistically significant amount (LEVEL 1).

CEA is of benefit only if it can be performed with a complication rate of ≤ 3% (LEVEL 1).

CEA primarily benefits men and those with a life expectancy of ≥ 5 years (LEVEL 1).

CAS may be considered as an alternative to CEA if CEA would present special difficulties and CAS can be performed with a complication rate ≤ 3% (LEVEL 2b).

**SURVIVAL PREDICTION**

Conrad et al, Ann Surg 2013

- Patients: 1791
- CEA: 2004
- 30 Day CVA: 1.1%
- 30 Day ipsi CVA: 0.8%
- 30 Day death: 0.7%
- 5-Year actual survival: 73%

Patients 1791

- Score
- 5-YR Survival (%)
  - 0 to 5: 92.5
  - 6 to 8: 83.6
  - 9 to 11: 63.7
  - 12 to 14: 46.5
  - ≥ 15: 33.8

**SURVIVAL PREDICTION**

Wallaert et al, JVS 2013

- Patients: 4114
- CEA: 4114
- 30 Day CVA
- 30 Day ipsi CVA
- 30 Day death
- 5-Year actual survival

Patients 4114

- Score
- 5-YR Survival (%)
  - 0 to 5: 92.5
  - 6 to 8: 83.6
  - 9 to 11: 63.7
  - 12 to 14: 46.5
  - ≥ 15: 33.8
Asymptomatic Carotid Stenosis—Survival Prediction

**SURVIVAL PREDICTION**
Wallaert et al, JVS 2013

- **Low Risk**: 94% Survival
- **Medium Risk**: 80% Survival
- **High Risk**: 8% Survival

Factors:
- Age
- CAD Rx
- COPD
- Diabetes
- Dialysis
- Severe CKD

**Patients**: 506

- **Age**: 1.79
- **CAD Rx**: 2.03
- **COPD**: 3.53
- **Diabetes**: 1.99
- **Dialysis**: 5.67
- **Severe CKD**: 2.46

3-Year actual survival: 86%
**SURVIVAL PREDICTION**
Alcocer et al., JVS 2013

<table>
<thead>
<tr>
<th>SCORE</th>
<th>3-YR MORTALITY</th>
</tr>
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<tbody>
<tr>
<td>≤ 2</td>
<td>6.1%</td>
</tr>
<tr>
<td>&gt; 2</td>
<td>31.6%</td>
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**OUTCOMES HIGH-RISK ASX CEA**

Wallaert et al, Stroke 2012

Table 1. Predicted 3- and 5-Year Mortality for Patients With Life-Limiting Conditions and the Associated Reference Used to Estimate Mortality

<table>
<thead>
<tr>
<th>Condition</th>
<th>Predicted 3-Year Mortality</th>
<th>Predicted 5-Year Mortality</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcinoma</td>
<td>10</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Atherosclerotic disease</td>
<td>62</td>
<td>50</td>
<td>62</td>
</tr>
<tr>
<td>Syphilitic CAV</td>
<td>62</td>
<td>49</td>
<td>62</td>
</tr>
<tr>
<td>Mitral valve prolapse</td>
<td>55</td>
<td>47</td>
<td>55</td>
</tr>
<tr>
<td>Age ≥ 70</td>
<td>41</td>
<td>62</td>
<td>41</td>
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<tr>
<td>ASA Class V</td>
<td>41</td>
<td>57</td>
<td>41</td>
</tr>
<tr>
<td>Severe COPD</td>
<td>42</td>
<td>54</td>
<td>42</td>
</tr>
</tbody>
</table>

OUTCOMES HIGH-RISK ASX CEA

Wallaert et al, Stroke, 2012

**COMBINED STROKE/DEATH**

Wallaert et al, Stroke, 2012
SURVIVAL PREDICTION

\[
\text{CLE} = \frac{P}{(1 - P) r_0 - r_1}
\]

CLE = critical life expectancy  
P = probability of periprocedural stroke  
r_0 = annual stroke rate without intervention  
r_1 = annual stroke rate after intervention

- Yuo et al, Medical Decision Making, 2013

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SURVIVAL PREDICTION

<table>
<thead>
<tr>
<th>SCENARIO</th>
<th>P</th>
<th>r_0</th>
<th>r_1</th>
<th>CLE</th>
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</thead>
<tbody>
<tr>
<td>ACAS (1995)</td>
<td>2.3</td>
<td>2.2</td>
<td>0.6</td>
<td>1.5</td>
</tr>
<tr>
<td>ACST (2004)</td>
<td>2.8</td>
<td>1.9</td>
<td>0.5</td>
<td>2.1</td>
</tr>
<tr>
<td>CREST (2010)</td>
<td>1.4</td>
<td>1.0</td>
<td>0.3</td>
<td>2.0</td>
</tr>
<tr>
<td>Guidelines &amp; BMT</td>
<td>3.0</td>
<td>1.0</td>
<td>0.5</td>
<td>6.4</td>
</tr>
</tbody>
</table>

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SURVIVAL PREDICTION

<table>
<thead>
<tr>
<th>STUDY</th>
<th>SCORE</th>
<th>SURVIVAL</th>
<th>TREAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conrad et al</td>
<td>15</td>
<td>33.8</td>
<td>NO</td>
</tr>
<tr>
<td>Wallaert et al</td>
<td>medium</td>
<td>80.0</td>
<td>YES</td>
</tr>
<tr>
<td>Alcocer et al</td>
<td>3</td>
<td>68.4</td>
<td>MAYBE</td>
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CAN WE USE SURVIVAL PREDICTION TO GUIDE TREATMENT

YES
**SHOULD WE USE SURVIVAL PREDICTION TO GUIDE TREATMENT**

**YES**

*We must beware of needless innovation, especially when guided by logic.*

Winston Churchill
# SURVIVAL PREDICTION

<table>
<thead>
<tr>
<th>STUDY</th>
<th>FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duschek et al</td>
<td>age</td>
</tr>
<tr>
<td></td>
<td>NT pro-BNP</td>
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