CAROTID REVASCULARIZATION: STENTING VS SURGERY

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THE GOAL IN CAROTID STENOSIS TREATMENT

THE GOAL OF EVERY VASCULAR TEAM SHOULD BE TO ACHIEVE:

NO DISABLING OR LETHAL STROKES IN THE POSTOPERATIVE PERIOD

NO HAEMODINAMICALLY RELEVANT CAROTID RESTENOSES OR OCCLUSIONS

NO R.N.C.R. IN THE LONG TERM FOLLOW-UP

IS IT POSSIBLE?

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The ad hoc committees of the AHA Stroke Council have produced guidelines on the acceptable operative risk of CEA. They recommend that the combined risk of stroke and death resulting from CEA should be **no more than 3% for asymptomatic patients, and 5% for symptomatic patients.**
THE GOAL IN CAROTID STENOSIS TREATMENT

How is it possible to reduce even more

• than 3% risk in asymptomatic patients?
• than 5% risk in symptomatic patients?
OUR PREOPERATIVE PROTOCOL

Clinical examination and cardiologic evaluation → Stratify medical operative risk
Eco-color-doppler and CT scan of SAT → Stratify procedure-related risk
PATIENT SELECTION: CEA or CAS

A. CRITERIA FOR CEA ARE:

- **LOW TO MODERATE RISK*** patients
- All symptomatic and asymptomatic cases if
  - inclusion criteria for revascularization are adequate.
  - have not CAS criteria.

B. CRITERIA FOR CAS ARE:

- **HIGH RISK*** patients
- Recurrent stenosis with fibrous plaque.
- Previous radical neck dissection or cervical irradiation
- Previous peripheral cranial nerve injuries
CAUSES OF NEUROLOGICAL COMPLICATIONS

- Positioning ischemia
- Embolization from surgical manipulation
- **Clamping ischemia**
- Early post-operative secondary thrombosis
  - Technical errors
  - Poor quality of arterial wall
  - Intimal flap in the distal overpass
- Embolization from residual debris
- Early post-operative primary thrombosis
  - Thrombofilia
  - Heart diseases (post-operative hypotension)
- Cerebral hemorrhage
- Reperfusion syndrome
- Wrong indication to treatment
- Thrombosis or embolism from other cerebral arteries
Cerebral clamping ischemia is related to three different parameters:

1. Blood flow
2. Cross-clamping time
3. Cerebral tissue tolerance to the ischemia

The interaction between these parameters determines the subjective tolerance to cerebral hypoperfusion.
EEG: TECHNIQUE

- EEG monitoring should start before patient positioning (neck hyperextension may induce cerebral hypoperfusion due to positional stenosis/occlusion).

- EEG monitoring should be continuous during the duration of the whole procedure in order to detect any delayed change.

- Although there is a relationship between different changing of the frequency and amplitude of the EEG track and cerebral ischemia, any EEG change, even if minimal, should be considered a sign of cerebral suffering.

- Significant EEG changes occur in 20-40% of patients with unilateral carotid disease and up to 70% with bilateral carotid disease.
In order to prevent a peri-operative cerebral ischemia, cerebral monitoring techniques have to be associated to a shunting strategy.

- Selective shunting (only in cases of monitoring modifications)
- Routine shunting
  - Before plaque removal
  - After plaque removal
Traditional method: Insertion before plaque removal*

Introduction of the shunt with the plaque in situ increases the risk of technical errors:
   a) Brain embolization from plaque fragments
   b) Intimal lesions and ICA dissection (thrombosis)
   c) Difficult overpass control (thrombosis)
   d) Shunt malfunction (clamp ischemia)

and explains shunt-related RNCR similar to postoperative results of CEA with
No shunt routinely

Sandmann W et al. Stroke 1993; 24: 1098
OUR EXPERIENCE

• Plaque removal

• Shunt insertion after plaque removal
OUR EXPERIENCE

Prevention of technical errors and immediate postoperative thrombosis

Rational of patch graft angioplasty after CEA

1) permits extension of arteriotomy to ICA for accurate overpass control

2) easier suture with shunt inserted

3) no suture stenosis

OUR EXPERIENCE

Rational of patch graft angioplasty after CEA

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EVERSION ENDARTERECTOMY
## CEA short term results in Padova


<table>
<thead>
<tr>
<th></th>
<th>CEA (n=3294)</th>
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<tbody>
<tr>
<td><strong>MORTALITY</strong></td>
<td>7 (0.24%)</td>
</tr>
<tr>
<td><strong>STROKE</strong></td>
<td>24 (0.75%)</td>
</tr>
<tr>
<td><strong>R.N.C.R.</strong></td>
<td>30 (0.91%)</td>
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*R.N.C.R.: Relevant Neurological Complication Rate*
CEA with PTFE patch: LONG-TERM RESULTS

RNC free Survival
CAS evolution in 2000-2011

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# EARLY RESULTS 2009-2011

* 1 death in CEA and 1 in CAS

<table>
<thead>
<tr>
<th>Risultati a 30 gg.</th>
<th>CAS n (%)</th>
<th>EAC n (%)</th>
<th>Totale n (%)</th>
<th>p-value</th>
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<tbody>
<tr>
<td></td>
<td>122 pts</td>
<td>568 pts</td>
<td></td>
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<tr>
<td>Major Stroke</td>
<td>2* (1.6%)</td>
<td>2* (0.35%)</td>
<td>4 (0.57%)</td>
<td>0.14</td>
</tr>
<tr>
<td>Minor Stroke</td>
<td>2 (1.6%)</td>
<td>3 (0.52%)</td>
<td>5 (0.725)</td>
<td>0.21</td>
</tr>
<tr>
<td>Major MI</td>
<td>2 (1.6%)</td>
<td>14 (2.46%)</td>
<td>16 (2.3%)</td>
<td>0.75</td>
</tr>
<tr>
<td>Death to MI</td>
<td>0 (-)</td>
<td>0 (-)</td>
<td>0 (-)</td>
<td>-</td>
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</tbody>
</table>

* 1 death in CEA and 1 in CAS

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IMMEDIATE CEA CONVERSION:

From CEA to CAS
IMMEDIATE CEA CONVERSION: 
From CEA to CAS
IMMEDIATE CEA CONVERSION:

From CEA to CAS
EA comprensiva dello stent
CONCLUSIONS

• Appropriate indications, careful surgical technique and accurate perioperative tactics help to make CEA an almost completely (> 80% of cases) safe procedure.

• CEA is an effective and durable procedure and today it is still considered the gold standard

• Today CAS is not an alternative to CEA, but both need to be considered as two collaborating methods in order to obtain the best early and long term outcomes for the patient
Thank you for your attention

I SINCERELY HOPE TO SEE ALL OF YOU IN PADUA AT THE VIP CONGRESS 2016