Carotid Artery Stenosis
Cerebral Hemodynamics
Neurocognitive Functioning

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Moderate to severe internal carotid artery (ICA) is common (10% by the 8th decade)

It may be responsible of:
- distal embolization (plaque vulnerability)
- impairment of cerebral hemodynamics (dilation of cerebral arterioles to counteract the drop in cerebral perfusion pressure)

It causes about 10% of all strokes

Carotid endarterectomy (CEA) is effective to prevent cerebral ischemia in patients with symptomatic ICA stenosis
Beyond stroke ...

- There is accruing evidence that ICA stenosis is linked to cognitive dysfunctions.

- Unlike stroke prevention, the influence of carotid revascularization on the neurocognitive functioning remains unclear.
Hospital Topics

Cerebral function before and after carotid endarterectomy

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Summary

Twenty men had their cerebral function measured preoperatively and three months after carotid endarterectomy using the Halstead-Reitan neuropsychological test battery. Thirteen patients were cerebrally impaired preoperatively, but 12 of them improved appreciably after surgery. Changes in internal carotid arterial blood flow measured peroperatively showed no significant correlation with the improvement in neuropsychological status. We think that carotid endarterectomy carries an even better prophylaxis for the brain as a whole than had been thought.
CURRENT RESEARCH REVIEW

Intellectual Change and Carotid Endarterectomy, Subjective Speculation or Objective Reality: A Review

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tions of research and clinical interest. First, are the subjective observations of intellectual deficiencies in patients with carotid insufficiency accurate; that is, do patients with carotid stenosis or occlusion demonstrate consistent objective intellectual impairment as compared to individuals without carotid arterial disease? Second, what are the effects, if any, of carotid endarterectomy on intellectual performance in patients with carotid insufficiency? The crucial question is whether endarterectomy restores or improves intellectual functioning or whether it merely prevents further degenerative impairment. Third, are certain physiological correlates such as improved carotid or cerebral blood flows following carotid endarterectomy related to the intellectual or behavioral changes described postoperatively?
Conclusions—Assessment of cognition after carotid revascularization is probably influenced by many confounding factors such as learning effect, type of test, type of patients, and control group, which are often minimized in their importance. ...at this time, no prediction can be done regarding its [of carotid revascularization] repercussions on higher intellectual functions. Larger studies appropriately designed and powered to assess cognition after carotid revascularization might change this view.
Study aim

To evaluate in patients with symptomatic high-grade ICA stenosis whether changes in cognitive performance and cerebrovascular reactivity occurred after CEA, and explore their relationship.
Study Design I

- Patients who underwent CEA, had suffered TIA within the past 6 months, and had an ipsilateral severe ICA stenosis
- Age- and sex- matched controls (1:1)
- Evaluations (T0 - T6 months) of:
  - cerebral hemodynamics [CVR to hypercapnia through the breath-holding index (BHI)];
  - neuropsychological functions
    [right: CPM, CFCT; left: (ph) and (ca) VF]
Study Design II

- Change in CVR and cognitive performance (delta between follow-up and baseline values)

- In order to account for practice effect, Z-scores for CEA patients were derived from the reference control group’s performance:
  \[ Z\text{-score} = \frac{(\text{change score}_{\text{CEA}} - \text{mean change score}_{\text{control}})}{\text{SD of change score}_{\text{control}}}. \]
Cerebrovascular hemodynamic insufficiency may represent one pathogenic mechanism underlying brain complications of carotid disease and a determinant of the cognitive dysfunction.
Key Points & Clinical Implications

- In severe ICA disease, the hemodynamic contribution to cognitive impairment could benefit from carotid revascularization (greater pre-operative CVR impairment $\rightarrow$ greater neurocognitive benefit)

- CEA may offer more than the prophylaxis of acute cerebrovascular events, and contribute to improve the neurocognitive functioning

Thanks alfierelattanzisimona@gmail.com