Neurocognitive changes after carotid revascularization: a review of the current literature

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CRD summary
The authors concluded that reported effects of carotid revascularisation on neurocognitive outcomes were not consistent across studies and no firm conclusions could be drawn. Evidence appeared to support the authors’ conclusions, but the limited search and lack of adequate reporting of review methods and results data made it difficult to comment on the reliability of the conclusions.

Authors' objectives
To evaluate the effect of carotid revascularisation on neurocognitive outcomes.

Searching
PubMed was searched for studies published in English between 1998 and 2007 using reported search terms. Reference lists were screened and related-articles searches performed on studies of interest.

Study selection
Prospective studies that evaluated a carotid artery intervention (carotid endarterectomy or stenting) and measured mood and/or cognitive function pre- and post-operatively were eligible for inclusion.

The included studies were randomised controlled trials, studies with a matched control group, non-randomised controlled studies and uncontrolled studies. Studies used a variety of cognitive tests to measure mood and/or neurocognitive function (details were reported) and often used a battery of tests. Patients with and without neurocognitive impairment pre-operatively were included. Where reported, operations were conducted using general or local anaesthesia. Controls groups varied considerably and included both healthy people without vascular risk factors or carotid stenosis and patients undergoing a variety of surgical procedures. The duration of follow-up ranged from one day to one year.

The authors stated neither how papers were selected for the review nor how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they formally assessed validity, but some of the methodological limitations of the included studies were discussed.

Data extraction
The authors stated neither how data were extracted for the review nor how many reviewers performed the data extraction. For each study, results were reported as text without accompanying values of outcome measures or results of statistical tests.

Methods of synthesis
The studies were grouped by intervention and reported study outcomes (improvement, no change or mixed results and deterioration) and combined in a narrative synthesis.

Results of the review
Twenty-two studies were included (n=1,474). These included one randomised controlled trial (n=40), one study with a matched control group (n=23), eight studies with a control group (n=687) and 12 uncontrolled trials (n=724). Sample size ranged from 10 to 159.

Methodological flaws included lack of long-term follow-up, lack of any control group and use of inappropriate control groups.

Overall, seven studies reported improvements in mood and/or cognition after revascularisation, 12 studies reported
mixed results and three studies reported deterioration.

Carotid endarterectomy (17 studies): Five studies reported improvements in mood and/or cognition after carotid endarterectomy, nine studies reported mixed results and three studies reported deterioration.

Stenting (four studies): Two studies reported improvements in mood and/or cognition after stenting and two studies reported mixed results.

Carotid endarterectomy versus stenting (one randomised controlled trial, n=40): There was no significant difference between carotid endarterectomy and stenting groups in the deficit rate at six weeks or six months. Carotid endarterectomies were performed under general anaesthesia and stenting under local anaesthesia.

Authors’ conclusions
Results on the effects of carotid revascularisation on neurocognitive outcomes were not consistent across studies and so no firm conclusions could be drawn.

CRD commentary
The review question was clearly stated. Inclusion criteria for study design were broad. Limiting the search to English language publications listed in one database plus references raised the possibility of publication and language bias and may have resulted in the omission of other relevant studies. Methods used to select studies and extract data were not described, so it was unknown whether efforts were made to reduce reviewer errors and bias. Although some methodological flaws of the included studies were described, no formal assessment of validity was reported. Results for individual studies were reported without supporting data or levels of statistical significance, which meant that it was not possible to verify the findings reported in the review. In view of the differences among studies, a narrative synthesis was appropriate. Evidence appeared to support the authors’ conclusions, but the limited search and lack of adequate reporting of review methods and results data made it difficult to comment on the reliability of the conclusions.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that there is a need for further research to evaluate revascularisation procedures in patients with carotid stenosis. Future studies should take account of the laterality of neurocognitive effects, baseline symptoms, the effect of pre-operative embolisation and confounding factors. Studies should use appropriate control groups and compare carotid endarterectomy with stenting.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.