A systematic review of the risks of stroke and death due to endarterectomy for symptomatic carotid stenosis
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Authors' objectives
To review the risks of stroke and death due to endarterectomy for symptomatic carotid stenosis.

Searching
MEDLINE was searched from 1980 to 1994 using the terms 'carotid endarterectomy' and 'carotid surgery'. The Cochrane Stroke Group's Specialised Register and the reference lists of all identified articles were also examined.

Study selection
Study designs of evaluations included in the review
Any study reporting the risks of stroke and death within 30 days of carotid endarterectomy in patients with symptoms referable to the operated carotid artery.

Specific interventions included in the review
Carotid endarterectomy for symptomatic stenosis.

Participants included in the review
Patients with symptomatic carotid stenosis were included.

Outcomes assessed in the review
The outcomes were mortality, risk of stroke and/or death, and incidence of adverse effects.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
The authors do not state that they assessed validity, although differences between prospective and retrospective studies were assessed.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction.

Methods of synthesis
How were the studies combined?
The 95% confidence intervals (CIs) of the overall risks of death and stroke and/or death were calculated allowing for extrabinomial variation. Multiple regression was also used to model the effect of a range of variables (including methodological variables) on risk of stroke or death.

The studies identified in this review were combined with those studies published before 1980 in a previous review (see Other Publications of Related Interest). Overall mortality and the risk of stroke and/or death were analysed in 5-year periods.

How were differences between studies investigated?
A chi-squared test of heterogeneity was carried out. Studies were also stratified according to whether they were performed prospectively or retrospectively, whether outcome assessment was carried out by a neurologist, and whether the paper was written by a neurologist, a surgeon or more than one surgeon. These factors were analysed, along with year of publication, in a multiple regression analysis of the operative risk of stroke and/or death.

Results of the review
Fifty-one studies (17,105 operations) were included: 19 prospective and 32 retrospective.

The overall mortality estimate (based on 17,105 operations) was 1.62% (95% CI: 1.3, 1.9) for patients with symptomatic stenosis. The overall risk of stroke and/or death in this group of patients (based on 15,956 operations) was 5.64% (95% CI: 4.4, 6.9). However, significant heterogeneity in the reported risk of stroke and/or death was observed (p<0.001). Among the rest of the included patients, the risk of fatal stroke was 0.86% (95% CI: 0.70, 1.02) and the risk of non-stroke death was 0.7% (95% CI: 0.56, 0.84).

Risks varied systematically with the methods and authorship of the study. The risk of stroke and/or death was highest in studies in which patients were assessed by a neurologist after study, and lowest in studies with a single author affiliated with a department of surgery.

After correcting for differences in study methodology and authorship in a multiple regression analysis, there was no temporal trend in the risk of stroke and/or death between 1980 and 1995.

Authors’ conclusions
The reported risks of endarterectomy for symptomatic carotid stenosis show significantly greater variability than would be expected by chance. However, much of this variability can be accounted for by differences in methodology and authorship. The 5.6% overall risk of stroke and/or death is consistent with present guidelines.

CRD commentary
The search strategy is limited by the fact that no attempt was made to identify unpublished data. In addition, although not stated by the review, it appears that only English language articles were included. The review examines the issue of authorship in some detail, but fails to address issues such as study design. The review could have been enhanced by a description of how inclusion criteria were applied, greater study detail, and a validity assessment of the primary studies.

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