Stent-protected angioplasty versus carotid endarterectomy in patients with carotid artery stenosis: meta-analysis of randomized trial data
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CRD summary
This review concluded that surgical treatment must be considered the standard treatment for severe carotid artery stenosis as there was no evidence that endovascular treatment was safer and it did not provide a better short-term outcome. Problems with review methodology, particularly the lack of validity assessment, mean that it is difficult to determine the reliability of this conclusion.

Authors' objectives
To compare endovascular treatment with carotid endarterectomy in patients with carotid artery stenosis.

Searching
PubMed, EMBASE and Science Citation Index were searched up to January 2008. Search terms were reported. References of identified studies were checked. Researchers and manufacturers were contacted.

Study selection
Randomised controlled trials (RCTs) of carotid endovascular treatment compared with carotid endarterectomy in patients with either symptomatic or asymptomatic carotid artery stenosis were eligible for inclusion in the review. Trials were required to have a minimum sample size of 25 patients per treatment arm. Studies of surgery involved placement of a stent and percutaneous transluminal angioplasty without stent were both eligible. The outcomes assessed were: stroke or death within 30 days and within one year; cranial neuropathy within 30 days; and myocardial infarction within 30 days. Also assessed were rates of disabling stroke or death within 30 days.

Most patients in included studies were symptomatic. Limited information was available on the patient populations. In all except one study, all patients underwent surgery that involved placement of a stent.

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

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
Percentages of patients with each outcome and odds ratios (OR) with 95% confidence intervals (CI) were extracted or calculated. The authors did not state how many reviewers performed the data extraction.

Methods of synthesis
Pooled ORs were calculated using the Peto fixed-effect model. Statistical heterogeneity between studies was assessed using the $\chi^2$ test.

Results of the review
Seven RCTs (n=2,973) were included in the review. Sample size ranged from 85 to 1,200.

Endovascular treatment was associated with a higher risk of any stroke or death with 30 days compared to surgery (8.2% versus 6.2%, OR 1.35, 95% CI 1.01 to 1.79, p=0.04; seven RCTs). There was no statistically significant difference between the groups in the risk of disabling stroke or death. There were also no significant differences in the risk of any stroke or death within one year. Moderate heterogeneity was found for all of these analyses.

There were significantly lower risks of cranial nerve palsy (0.2% versus 4.7%, OR 0.17, 95% CI 0.11 to 0.27,
p<0.0001; six RCTs) and myocardial infarction (0.9% versus 2.3%, OR 0.37, 95% CI 0.16 to 0.89, p=0.027; five RCTs) in the endovascular treatment than in the surgery groups. There was no evidence of statistically significant heterogeneity for either analysis.

**Authors’ conclusions**

Surgical treatment must be considered the standard treatment for severe carotid artery stenosis; there was no evidence that endovascular treatment was safer and it did not provide a better short-term outcome. Long-term data on outcome and restenosis rates for endovascular treatment was not yet available.

**CRD commentary**

The review question and the inclusion criteria were both clear and specific. The authors searched three relevant databases and made some attempts to identify unpublished studies. Although no language restrictions were reported, one study was excluded primarily on the basis of language. This may have increased the risks of bias and omission of relevant studies. The authors did not report using methods designed to reduce reviewer bias and error in the selection of studies and the extraction of data. No assessment of the validity of the included studies was reported. This made it difficult to determine the reliability of the evidence provided. Only limited information was available about the patients included in the review. The authors' decision to employ meta-analysis appeared appropriate. Statistical heterogeneity was assessed and some explanations for it were discussed. The authors' conclusions were appropriate to the results of the review. However, problems with the review methodology, particularly the lack of a validity assessment, mean that it is difficult to determine their reliability.

**Implications of the review for practice and research**

**Practice:** The authors stated that surgical treatment must be considered the standard treatment for severe carotid artery stenosis.

**Research:** The authors stated that future meta-analyses (which included ICSS and CREST trials) should allow definitive treatment recommendations.

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