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[Intervention Review]

Carotid endarterectomy for symptomatic carotid stenosis

Amaraporn Rerkasem[1], Saritphat Orrapin[2], Dominic PJ Howard[3], Kittipan Rerkasem[1,4]

[1]Research Institute for Health Sciences, Chiang Mai University, Chiang Mai, Thailand. [2]Division of Vascular Surgery, Department of Surgery, Faculty of Medicine, Thammasat University (Rangsit Campus), Pathum thani, Thailand. [3]Centre for Prevention of Stroke and Dementia, Nuffield Department of Clinical Neurosciences, University of Oxford, Oxford, UK. [4]Division of Vascular and Endovascular Surgery, Department of Surgery, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand

Contact address: Kittipan Rerkasem, rerkase@gmail.com.

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ABSTRACT

Background

Stroke is the third leading cause of death and the most common cause of long-term disability. Severe narrowing (stenosis) of the carotid artery is an important cause of stroke. Surgical treatment (carotid endarterectomy) may reduce the risk of stroke, but carries a risk of operative complications. This is an update of a Cochrane Review, originally published in 1999, and most recently updated in 2017.

Objectives

To determine the balance of benefit versus risk of endarterectomy plus best medical management compared with best medical management alone, in people with a recent symptomatic carotid stenosis (i.e. transient ischaemic attack (TIA) or non-disabling stroke).

Search methods

We searched the Cochrane Stroke Group Trials Register, CENTRAL, MEDLINE Ovid, Embase Ovid, Web of Science Core Collection, ClinicalTrials.gov, and the WHO International Clinical Trials Registry Platform (ICTRP) portal to October 2019. We also reviewed the reference lists of all relevant studies and abstract books from research proceedings.

Selection criteria

We included randomised controlled trials (RCTs) comparing carotid artery surgery plus best medical treatment with best medical treatment alone.

Data collection and analysis

Two review authors independently selected studies, assessed risk of bias, and extracted the data. We assessed the results and the quality of the evidence of the primary and secondary outcomes by the GRADE method, which classifies the quality of evidence as high, moderate, low, or very low.

Main results

We included three trials involving 6343 participants. The trials differed in the methods of measuring carotid stenosis and in the definition of stroke. Using the primary electronic data files, we pooled and analysed individual patient data on 6092 participants (35,000 patient-years of follow-up), after reassessing the carotid angiograms and outcomes from all three trials, and redefining outcome events where necessary, to achieve comparability.

Surgery increased the five-year risk of any stroke or operative death in participants with less than 30% stenosis (risk ratio (RR) 1.25, 95% confidence interval (CI) 0.99 to 1.56; 2 studies, 1746 participants; high-quality evidence). Surgery decreased the five-year risk of any

stroke or operative death in participants with 30% to 49% stenosis (RR 0.97, 95% CI 0.79 to 1.19; 2 studies, 1429 participants; high-quality evidence), was of benefit in participants with 50% to 69% stenosis (RR 0.77, 95% CI 0.63 to 0.94; 3 studies, 1549 participants; moderate-quality evidence), and was highly beneficial in participants with 70% to 99% stenosis without near-occlusion (RR 0.53, 95% CI 0.42 to 0.67; 3 studies, 1095 participants; moderate-quality evidence). However, surgery decreased the five-year risk of any stroke or operative death in participants with near-occlusions (RR 0.95, 95% CI 0.59 to 1.53; 2 studies, 271 participants; moderate-quality evidence).

Authors' conclusions

Carotid endarterectomy reduced the risk of recurrent stroke for people with significant stenosis. Endarterectomy might be of some benefit for participants with 50% to 69% symptomatic stenosis (moderate-quality evidence) and highly beneficial for those with 70% to 99% stenosis (moderate-quality evidence).

PLAIN LANGUAGE SUMMARY

Carotid surgery in people who have symptoms with narrowing of the carotid artery

Question
What are the benefits of surgical removal of the fatty deposits and blood clots from inside the carotid artery wall (carotid endarterectomy) for people who have recently (within four to six months) had symptoms due to carotid stenosis (narrowing of the artery that supplies blood to the brain)?

Background
Strokes cause long-term disability and death. The chances of dying from the first stroke are 15% to 35%, and increase to 69% in subsequent strokes, which often occur within one year of the first attack. Carotid endarterectomy may reduce the risk of subsequent or recurrent stroke, but carries a risk of complications immediately before, after, and during the operation, including disabling stroke and death. There is a 7% risk of stroke and death within 30 days of endarterectomy.

Search date
We searched for studies to 23 October 2019.

Study characteristics
This review identified three randomised controlled trials (6343 participants randomised), which compared carotid surgery with no carotid surgery (i.e. best medical therapy plus surgery versus best medical therapy alone) in participants with carotid stenosis and recent transient ischaemic attacks (TIA), or minor ischaemic strokes in the territory of that artery. The trials were carried out in centres in Europe, USA, Canada, Israel, South Africa, and Australia. The gender ratio of participants was 2.6:1 (72% men and 28% women); 90% of participants were younger than 75 years old.

The results of the three trials were initially conflicting, because they differed in how they measured carotid stenosis and how they defined the outcomes. To address this discrepancy, we reassessed the original patient data using the same methods and definitions, so results could be compared.

Key results
Carotid endarterectomy reduced the risk of further stroke for people with significant stenosis. Results were particularly striking for older people, male participants, those with a significant stenosis (70% to 99%), and those who were operated on within two weeks of their TIA or stroke. Endarterectomy might be of some benefit for participants with 50% to 69% stenosis. We did not find any benefit of carotid surgery for those in whom the stenosis was minor (less than 50%) or where the carotid artery was almost blocked (near occlusion).

Quality of the evidence
The evidence was of moderate or high quality for all the results. Therefore, we can be moderately or very confident in the results.