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Systematic Review of Randomized Controlled Trials of Patch Angioplasty Versus Primary Closure During Carotid Endarterectomy

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Carotid endarterectomy has been shown to reduce the risk of stroke in selected patients with internal carotid artery stenosis. Carotid patch angioplasty performed during surgery may reduce the risk of restenosis, and consequently reduce the long-term risk of recurrent stroke. However, patching itself may be associated with complications.

Objectives

We tested the hypothesis that carotid patch angioplasty resulted in a lower rate of significant arterial re-stenosis and therefore fewer recurrent strokes and stroke-related deaths without an increase in perioperative complications.

Search Strategy

Two reviewers independently searched MEDLINE (1996 to April 2003), EMBASE (1980 to 2002), and Index to Scientific and Technical Proceedings (1980 to 1994). We also searched the Stroke Group trials register (April 2003), hand-searched 13 relevant journals up to 2002, and searched the reference lists of articles identified.

Selection Criteria

Randomized and quasi-randomized trials comparing carotid patch angioplasty with primary closure in any patients undergoing carotid endarterectomy were included. Any type of patch material was eligible.

Data Collection and Analysis

Thirty-day and long-term risks of stroke, death, ipsilateral stroke, re-stenosis (>50%), and wound complications were independently extracted by two reviewers (R.B., K.R.). Proportional risk reductions were calculated using the Peto method. Heterogeneity between trial results was tested using the standard χ^2 test.

Main Results

Seven trials involving 1193 patients undergoing 1281 operations were analyzed. Follow-up varied from hospital discharge to 5 years. Three trials used only vein patches, 1 trial used only PTFE patches, and 3 trials used both. The quality of trials was variable. Allocation concealment was only adequate in 4 trials. Clinical assessment was definitely blinded in only 3 trials, but re-stenosis was assessed blind in all but 2 trials.

The overall perioperative risks of any stroke, ipsilateral stroke, and death were 2.8% (29/1019 patients), 2.7% (33/1201 patients), and 1.0% (10/1019 patients), respectively. Overall estimates of treatment effect from meta-analysis of the 7 trials are shown in the Figure. Carotid patch angioplasty was associated with a reduction in the risk of any perioperative stroke (odds ratio [OR]=0.33; 95% confidence interval [CI], 0.2 to 0.7; $P=0.004$), perioperative ipsilateral stroke (OR=0.32; 95% CI, 0.2 to 0.7; $P=0.001$), and stroke or death during the perioperative period (OR=0.40; 95% CI, 0.2 to 0.8; $P=0.007$). Patching was also associated with a reduced risk of perioperative arterial occlusion (OR=0.12; 95% CI, 0.06 to 0.4; $P=0.00004$), and decreased re-stenosis during long-term follow-up in 5 trials, (OR=0.22; 95% CI, 0.1 to 0.3; $P<0.00001$). Risk of stroke and death was also reduced on long-term follow-up (OR=0.54; 95% CI, 0.4 to 0.8; $P=0.004$).

The sample sizes were relatively small, data were not available for all outcomes from all trials, and there was significant loss to follow-up. Furthermore, there were very few arterial complications, with either patch or primary closure. No significant correlation was found between use of patch angioplasty and the risk of either perioperative or long-term all-cause death rates.

Implications for Practice

This review shows a significant reduction in perioperative and long-term risks of stroke and of perioperative carotid occlusion

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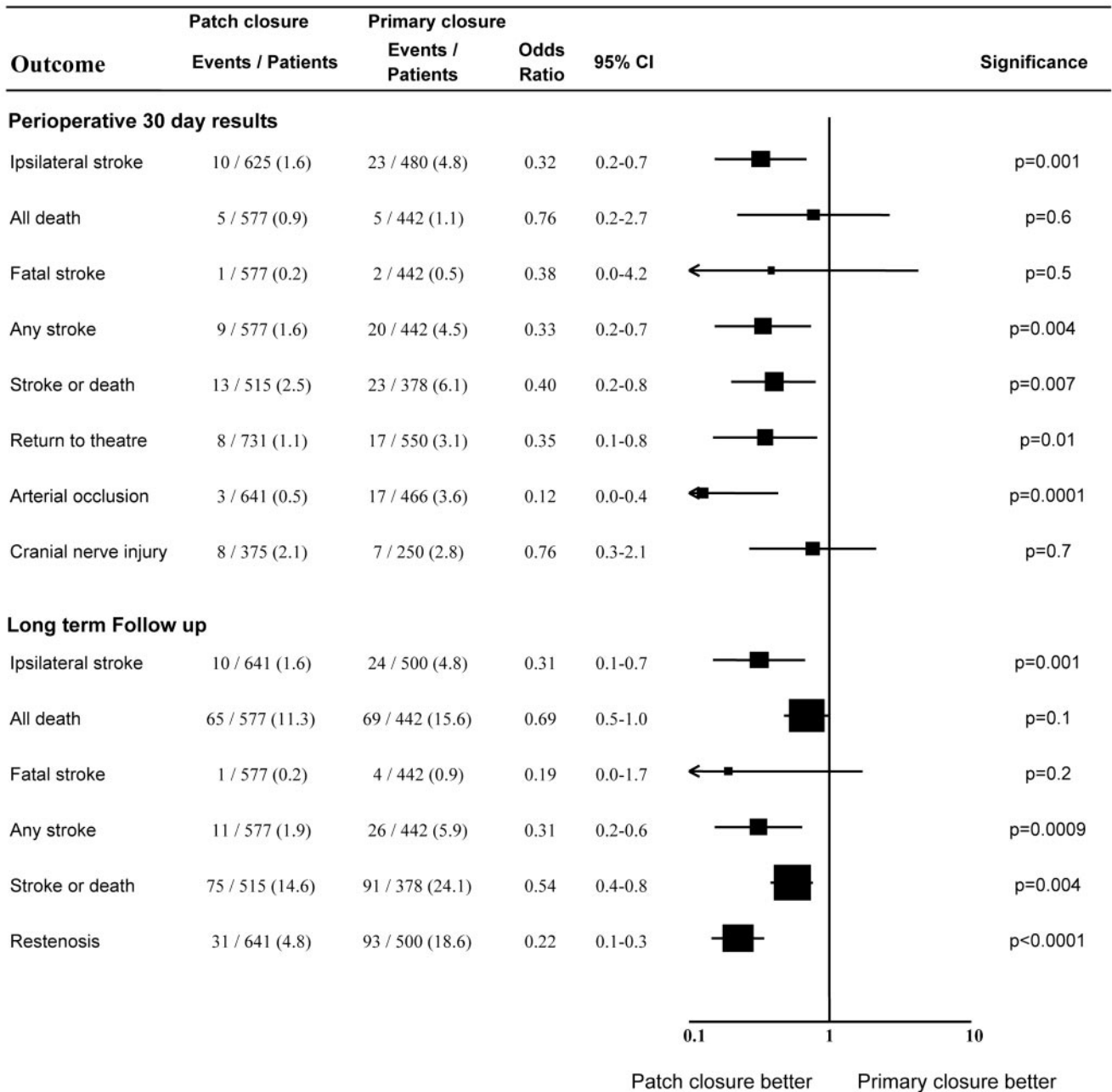
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Summary estimates of treatment effect from all meta-analyzed outcomes from 7 trials comparing patch angioplasty versus primary closure: 1193 patients (1281 operations) were included in the review, but data were not available for all outcomes from all trials, and there was significant loss to follow-up.

and later re-stenosis associated with the use of patching. A policy of selective patching of only those arteries thought to require a patch at the time of operation compared with no patching has not been tested in randomized controlled trials.

Implications for Research

The results of this review appear to support a policy of routine patching. However, more evidence is required, as numbers are still small.

Note: The full text of this review is available in the Cochrane Library (for subscribers: <http://www3.interscience.wiley.com/cgi-bin/mrwhome/106568753/HOME>). The full article should be cited as: Bond R, Rerkasem K, AbuRahma AF, Naylor AR, Rothwell PM. Patch angioplasty versus primary closure for carotid endarterectomy. *Cochrane Database Syst Rev* 2004, Issue 2.

KEY WORDS: angioplasty ■ endarterectomy, carotid