Local versus general anaesthetic for carotid endarterectomy

Kittipan Rerkasem M.D. Ph.D.,¹ Rick Bond MBBS Dphil,² Peter M. Rothwell M.D. Ph.D ²

¹Department of Surgery, Chiang Mai University, Chiang Mai, Thailand

²Stroke Prevention Research Unit, University of Oxford, Oxford, UK

Address for correspondence and reprints:
Dr Peter Rothwell
Stroke Prevention Research Unit
Department of Clinical Neurology
Radcliffe Infirmary
Woodstock Road
Oxford OX2 6HE
UNITED KINGDOM

Fax: +44-(0)1865-228572
Tel: +44-(0)1865-224153
e-mail: peter.rothwell@cneuro.ox.ac.uk

Key words: carotid endarterectomy, prevention, stroke, anaesthetic
Carotid endarterectomy (CEA) markedly reduces the risk of stroke in people with recently symptomatic 70-99% carotid artery stenosis and to a lesser extent in people with 50-69% stenosis. However, benefit is dependent on maintaining a low operative risk, which may depend to some extent on the type of anaesthetic used. Non-randomised comparisons suggest that CEA under local anaesthesia (LA) is associated with a lower operative risk of stroke and death than CEA under general anaesthesia (GA), but such data are potentially unreliable and randomised studies are required.

**Objectives**
The aim of this review was to assess the operative risks of CEA under LA compared with CEA under GA.

**Search strategy**
Two reviewers independently searched MEDLINE (1966 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. We also advertised the review in Vascular News in August 2001.

**Selection criteria**
Randomised trials and non-randomised studies comparing CEA under LA versus GA.

**Data collection & analysis**
One reviewer selected studies for inclusion and another independently checked the decisions. Two reviewers assessed trial quality and independently extracted the data.

**Main results**
Seven randomised trials involving 554 operations, and 41 non-randomised studies involving 25622 operations were included... Eleven of the non-randomised studies were prospective and 29 reported on a consecutive series of patients, but the methodological quality of many of the non-randomised trials was questionable. In nine non-randomised studies the number of arteries, as opposed to the number of patients, was unclear. Meta-analysis of the non-randomised studies showed that the use of local anaesthetic was associated with significant reductions in the odds of death (35 studies), stroke (31 studies), stroke or death (26 studies), myocardial infarction (22 studies), and pulmonary complications (7 studies), within 30 days of the operation.
Meta-analysis of the seven randomised studies revealed a non-significant trend towards a reduced mortality within 30 days of the operation with LA (pooled odds ratio = 0.23, 95% CI = 0.05-1.02), but this estimate was based on a very small number of events (table). LA was however associated with a more convincing reduction in local post-operative haemorrhage (OR = 0.31, 95% CI = 0.12 to 0.79) within 30 days of the operation. There was no evidence of a difference in the odds of operative stroke.

**Implications for practice**

There is insufficient evidence from randomised trials comparing CEA performed under LA versus GA to allow reliable conclusions to be drawn. Non-randomised studies suggest potential benefits with the use of local anaesthetic, but these studies may be biased.

**Implications for research**

More randomised studies are needed to compare CEA performed under LA versus GA. A large randomized trial (GALA) is currently ongoing and has randomized over 1000 patients so far.

**Table 1** Pooled absolute risks and odds of complications following CEA from 7 randomised trials of CEA performed under LA versus GA. Odds ratios were calculated by the standard Peto method. Heterogeneity of estimates between studies was calculated by the Chi-squared method. CI= confidence interval, MI= Myocardial infarction

<table>
<thead>
<tr>
<th>Outcome</th>
<th>LA Event/operation</th>
<th>GA Event/operation</th>
<th>Odds ratio</th>
<th>95% CI</th>
<th>Heterogeneity p</th>
</tr>
</thead>
<tbody>
<tr>
<td>All deaths</td>
<td>1/280</td>
<td>6/274</td>
<td>0.23</td>
<td>0.05-1.02</td>
<td>0.7</td>
</tr>
<tr>
<td>Stroke</td>
<td>6/280</td>
<td>6/274</td>
<td>1.01</td>
<td>0.32-3.18</td>
<td>0.2</td>
</tr>
<tr>
<td>Stroke and death</td>
<td>7/280</td>
<td>11/274</td>
<td>0.63</td>
<td>0.25-1.62</td>
<td>0.3</td>
</tr>
<tr>
<td>MI</td>
<td>4/280</td>
<td>5/274</td>
<td>0.77</td>
<td>0.21-2.88</td>
<td>0.6</td>
</tr>
<tr>
<td>Local haemorrhage</td>
<td>4/223</td>
<td>14/221</td>
<td>0.31</td>
<td>0.12-0.79</td>
<td>0.6</td>
</tr>
<tr>
<td>Nerve injury</td>
<td>4/167</td>
<td>2/166</td>
<td>1.98</td>
<td>0.39-9.97</td>
<td>0.2</td>
</tr>
<tr>
<td>Artery shunted</td>
<td>56/223</td>
<td>60/221</td>
<td>0.68</td>
<td>0.40-1.14</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

**Reference**