Vein-patch closure was better than primary closure in decreasing early strokes and arterial occlusion in carotid endarterectomy


Objective
To compare early outcomes for patients who have carotid endarterectomy (CEA) with primary closure, vein-patch closure (saphenous and jugular veins), or polytetrafluoroethylene (PTFE) patch closure.

Design
Randomised controlled trial.

Setting
A U.S. university hospital.

Patients
357 adults (mean age 68 y, 51% men) who were scheduled for CEA (315 unilateral and 42 bilateral procedures). Exclusion criteria were repeat CEA, CEA with concomitant coronary artery bypass grafting, or internal carotid artery diameters < 4 mm.

Intervention
Primary closure (n = 135) using polypropylene sutures, PTFE patches (n = 134) using a 0.4-mm cardiovascular patch, or vein-patch closure (n = 130) using saphenous (n = 70) or jugular veins (n = 60). The patch width was 5 to 6 mm.

Main outcome measures
The main outcome measure was 30-day stroke rate. Secondary outcomes were 30-day mortality, neurological, cardiac, respiratory, and bleeding complications; and occlusion rates.

Main results
The saphenous and jugular vein groups did not differ, and their results were analysed as 1 group. Patients who received vein-patch closure had a lower rate of stroke (P = 0.02) and a lower rate of combined stroke and reversible ischaemic deficits (P = 0.04) than did patients who received primary closure. Primary closure also had a higher rate of narrowed arteries ≥ 50% compared with all other groups (P ≤ 0.03). The PTFE-patch closure group did not differ for any outcome compared with the vein-patch closure group and only showed a trend to fewer strokes (1 vs 6, P = 0.06) when compared with the primary closure group. The 3 groups did not differ for mortality or other complications.

Conclusion
Patients who received vein-patch closure (saphenous or jugular veins) compared with primary closure for CEA had lower rates at 30 days for stroke, stroke plus reversible ischaemic deficits, and artery narrowing ≥ 50%.

Source of funding: No external funding.

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Vein-patch vs primary closure for carotid endarterectomy

<table>
<thead>
<tr>
<th>Outcomes at 30 days</th>
<th>Vein-patch closure</th>
<th>Primary closure</th>
<th>RR (95% CI)</th>
<th>ARR</th>
<th>NNT (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>EER</td>
<td>CER</td>
<td>100%</td>
<td>4%</td>
<td>23 (13 to 103)</td>
</tr>
<tr>
<td>Stroke and ischaemic deficits</td>
<td>1%</td>
<td>5%</td>
<td>85% (10 to 98)</td>
<td>4%</td>
<td>23 (10 to 257)</td>
</tr>
</tbody>
</table>

*Abbreviations defined in Glossary, RRR, ARR, NNT, and CI calculated from data in article.

Commentary
This detailed study by AbuRahma and colleagues adds to our knowledge of this topic and is worthy of careful analysis. The statistical power to detect differences among the groups was reduced by a lower-than-expected rate of neurological events. The execution of the study was probably appropriate, although no information is given about the randomisation.

The main results were a reduction in perioperative stroke in patients whose carotid arteries were patched and a reduction in the incidence of carotid stenosis of ≥ 50% at 30 days. Prevention of perioperative stroke is a major objective in carrying out CEA. Analysis of patients who had a stroke showed that carotid occlusion was the predominant event. The issue is how best to prevent carotid thrombus. The conventional wisdom is that early events, such as arterial occlusion, are predominantly caused by technical error. Patching may reduce carotid occlusion by enlarging the artery and masking the effects of residual defects in the artery. Would alternative methods, such as intraoperative angiography or ultrasonography, detect these imperfections and allow them to be corrected immediately, thus reducing the incidence of perioperative occlusion?

The second issue is the relevance of residual or recurrent stenosis. We have known since the early work with duplex ultrasonography surveillance that flow abnormalities can be detected in many patients after CEA. The chance of stroke from recurrent carotid disease is, however, very low (0.3% for patients who have CEA) (1). Surgeons would prefer a postoperative scan to be normal rather than indicating 50% residual or recurrent stenosis, but the question of whether this makes a long-term difference to the patient is still unanswered.

This study adds further support to those who argue in favour of routine patching, but in my opinion, the evidence does not yet mandate that approach.

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Reference