Stenting versus endarterectomy for symptomatic carotid stenosis

An international multicentre randomised trial found that carotid stenting was as effective as endarterectomy at preventing fatal or disabling stroke for up to 10 years in people with symptomatic carotid stenosis.

Overview: Carotid stenosis occurs when fatty deposits build up in the carotid arteries that carry blood to the brain, causing them to narrow and harden (NICE 2011). Blood clots that form on the plaques can detach and lodge in thinner arteries in the brain, causing symptoms like a transient ischaemic attack (TIA, sometimes called a ‘mini stroke’) or a stroke.

One approach to treating symptomatic carotid stenosis is carotid endarterectomy, where a cut is made in the neck to access the narrowed artery and remove the fatty plaques (NHS Choices 2014). Another less-invasive technique involves using a metal mesh tube called a stent to widen the narrowed carotid artery. The stent is inserted into an artery in the leg and moved into place in the carotid artery by using a fine wire.

Previous studies indicate that compared with carotid endarterectomy, stenting is associated with a higher risk of a procedure-related stroke or death in the first 30 days after treatment (Bonati et al. 2012). The long-term efficacy and safety of carotid artery stenting compared with endarterectomy is not clear.

Current advice: The NICE guideline on stroke recommends that all people with suspected non-disabling stroke or TIA who are considered candidates for carotid endarterectomy should have carotid imaging within 1 week of onset of symptoms.

People with stable neurological symptoms from acute non-disabling stroke or TIA who have symptomatic carotid stenosis of 50–99% according to North American criteria, or 70–99% according to European criteria, should be assessed and referred for carotid endarterectomy within 1 week of onset of symptoms. These people should undergo surgery within a maximum of 2 weeks of onset of stroke or TIA symptoms.

NICE guidance on carotid artery stent placement recommends carotid artery stenting for symptomatic extracranial carotid stenosis, provided that normal arrangements are in place for clinical governance and audit or research. During the consent process, clinicians should ensure that patients understand
the risk of stroke and other complications associated with this procedure. Clinicians should also ensure that patients understand the reasons for advising carotid artery stent placement rather than endarterectomy in their particular case.

The **National Stroke Strategy** recommends considering immediate referral for appropriately urgent specialist assessment and investigation in all patients presenting with a recent TIA or minor stroke. Carotid intervention for recently symptomatic severe carotid stenosis should be regarded as an emergency procedure in patients who are neurologically stable, and should ideally be performed within 48 hours of a TIA or minor stroke.

The NICE Pathway on [carotid imaging and carotid endarterectomy for people with TIA or non-disabling stroke](https://www.nice.org.uk/guidance) brings together all related NICE guidance and associated products on the area in a set of interactive topic-based diagrams.

**New evidence:** Bonati et al. (2014) reported the long-term results of the International Carotid Stenting Study (ICSS), a multicentre randomised clinical trial of stenting versus endarterectomy for the treatment of symptomatic carotid stenosis.

ICSS recruited 1713 people older than 40 years who had atherosclerotic carotid stenosis with symptoms (for example, a recent TIA or ischaemic stroke) and at least 50% reduction in the diameter of the affected artery. Participants were identified from 50 centres in Europe, Australia, New Zealand and Canada and randomised to undergo carotid stenting (including use of a cerebral protection device; n=855) or endarterectomy (standard or eversion; n=858). All participants received medical care, including antiplatelet therapy or anticoagulation if indicated. Participants were followed up at 30 days after treatment (end of the procedural period), 6 months after randomisation, and every year thereafter.

This analysis considered long-term data from up to 10 years of follow-up (median=4.2 years). In analysis of all participants randomised to treatment (n=1710), the incidence of fatal or disabling stroke was similar in the stenting group (52 events) and the endarterectomy group (49 events; hazard ratio=1.06, 95% confidence interval [CI] 0.72 to 1.57). The cumulative 5-year risk of fatal or disabling stroke did not differ significantly between the stenting group (6.4%) and the endarterectomy group (6.5%; absolute risk difference at 5 years =–0.2%, –2.8 to 2.5).

People in the stenting group were significantly more likely to experience any stroke than those in the endarterectomy group (hazard ratio=1.71, 95% CI 1.28 to 2.30, p<0.001). This difference was driven largely by a higher incidence of non-disabling stroke in the stenting group (73 events versus 27 events in the endarterectomy group). Functioning at 5 years (measured by the distribution of modified Rankin scale scores) did not differ significantly between groups.

Limitations of this analysis include that the assessment of functioning could not take into account subjective perception of wellbeing or subtle changes in physical or mental functioning. As such, the study cannot rule out any differences in long-term complications of stroke between the treatment groups. In addition, stenting was a relatively new procedure when ICSS started. Experience with the procedure and safety may have improved since the study was initiated.

**Commentary:** “In modern clinical practice, patients with symptoms suggestive of a TIA or a minor stroke are assessed for risk of a subsequent disabling stroke. The aim is to identify those with severe carotid stenosis and refer them for surgery within a short time period from symptom onset (2 weeks ideally). The reason for this urgency is that the risk of a disabling stroke is highest within the first 2 weeks after symptom onset. This is because the majority of subsequent strokes are caused by a blood clot detaching from the ‘at risk’ carotid plaque and causing a blockage rather than the plaque itself blocking the artery. In addition, patients with TIA and carotid stenosis are now treated much earlier and more aggressively with medical treatments – often high dose statins and dual antiplatelet regimens – to ‘stabilise’ an ‘at risk’ plaque.
“Participants were recruited to the ICSS study between 2001 and 2008, mostly predating the 2007 National Stroke Strategy and the 2008 NICE stroke guidance. Consequently, patients were randomised to surgery or stenting much later than the 2 weeks from symptom onset recommended by NICE (most ‘within 6 months’ of symptom onset). This means that ICSS represents a study of intervention, whether stent or operation, in people with relatively much more stable (less risky) atheromatous plaques.

“Within this biological caveat, the results from the 4–5 year follow-up in ICSS are promising. The study shows that stenting carries less risk of an early truly disabling stroke than originally thought and that long-term outcome is similar with stenting and endarterectomy. These findings are unlikely to challenge current NICE guidance. However, for patients with delayed presentations (and more stable plaques) and those with significant comorbidities and frailty, stenting may provide a safer alternative option to endarterectomy.

“Given improvements in stent technology, whether early stenting is safe and effective for symptomatic carotid stenosis and is superior to optimal medical management should be the subject of ongoing research.” – Dr Elizabeth Warburton, Consultant Physician in Stroke Medicine, Department of Clinical Neurosciences, University of Cambridge and NICE Fellow

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