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Current Status of Carotid Stenting Versus Endarterectomy

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• Embolic protection • Carotid angioplasty/stenting (CAS)
• Carotid endarterectomy (CEA) • Filter • Reversal flow • Stent • Diffusion

Key points

- For symptomatic de novo carotid stenosis in good risk patients, carotid endarterectomy (CEA) remains the standard of care.
- The use of carotid artery stenting (CAS) should be selective at this stage and must be done by experienced operators/centers.
- CAS may also be preferable in most patients with post-CEA restenosis.

Stroke is the third most common cause of mortality worldwide. About 20% to 30% of strokes have been attributed to atherosclerotic disease of the extracranial carotid artery. According to the North American Symptomatic Carotid Endarterectomy Trial [1], more than 70% of stenosis is associated with a stroke risk of 26% in symptomatic patients at 2 years. Although it is not the only etiology, extracranial carotid atherosclerosis is the most common surgically treatable condition for prevention of ischemic stroke. Multiple randomized controlled studies over the last 2 decades for both symptomatic and asymptomatic carotid stenosis have shown the efficacy of carotid endarterectomy (CEA) in reducing the risk of stroke over medical therapy alone [2,3].

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Since its early inception in 1980 by Kerber and colleagues [4], carotid artery transluminal angioplasty has evolved into an acceptable alternative to CEA in a select group of patients. Both options for treating carotid artery stenosis have been subjected to extensive comparison over the last 2 decades with multiple randomized trials, mainly regarding efficacy, safety, and durability. Although these trials carry significant weight, they may not represent, in great part, the real-world experience. The Carotid Revascularization Endarterectomy versus Stenting Trial (CREST) investigators [5] have shown that these 2 procedures (CEA and carotid artery stenting [CAS]) are somewhat comparable. This multicenter, well-designed, prospective, randomized, controlled study examined the primary endpoints of stroke, myocardial infarction (MI), and death in 2502 patients. Evaluation was initiated in the preoperative period and extended to 4 years after randomization. Although there were no differences in the composite endpoints as defined by periprocedural (within 30 days) death, stroke, or MI between CEA and CAS; strokes were more frequent after CAS (4.1% vs 2.3%; $P = .01$). All respected authorities agree that the lower risk of MI and cranial nerve injury with CAS compared with CEA is counterbalanced by an increased risk of ipsilateral stroke events.

REVIEW OF RANDOMIZED CONTROLLED CAROTID TRIALS (CAROTID ARTERY STENTING VS CAROTID ENDARTERECTOMY)

The Carotid and Vertebral Artery Transluminal Angioplasty Study

This multicenter randomized carotid trial included 504 patients (90% symptomatic) with carotid stenosis (carotid angioplasty [n = 251] or CEA [n = 253]), with a median follow-up of 5 years [6] in an intention-to-treat analysis. Within 30 days of treatment, there were more minor strokes that lasted less than 7 days in the endovascular group (8 [3.2%] vs 1 [0.4%]), but the number of other strokes in any territory or death was the same (25 [10%] vs 25 [9.9%]). By comparing endovascular treatment with CEA after the 30-day posttreatment period, the 8-year incidence and hazard ratio (HR) at the end of follow-up for ipsilateral nonperioperative stroke was 11.3% versus 8.6% (HR, 1.2; 95% CI, 0.59–2.54); for ipsilateral nonperioperative stroke or transient ischemic attack it was 19.3% versus 17.2% (HR, 1.3; 95% CI, 0.78–2.14); and for any nonperioperative stroke was 21.1% versus 15.4% (HR, 1.7; 95% CI, 0.99–2.80). The primary endpoint of 70% or greater restenosis was higher in the angioplasty group (HR, 3.17; $P < .0001$). It should be noted that carotid stents were used only in 26% of the angioplasty group. Patients who received stents had a significantly lower incidence of restenosis than patients who underwent angioplasty alone (HR, 0.43; $P = .04$).

The Stenting and Angioplasty with Protection in Patients at High Risk for Endarterectomy Trial

This noninferiority trial included 334 patients and was the first randomized carotid trial to use mandatory cerebral protection devices [7]. High-risk surgical