

carotid intimal medial thickness (IMT) and a decrease in left ventricular mass in patients with type 2 diabetes.

**Summary:** Target levels of SBP and LDL-C have been recommended for patients with diabetes. The standard recommendations are target levels for LDL-C of 100 mg/dL and an SBP of  $\leq 130$  mm/Hg. In this study the standard target levels were compared with more aggressive targets of LDL-C ( $\leq 79$  mg/dL) and SBP ( $\leq 115$  mm Hg). This was a randomized, open-label, blinded end point trial. The study period was 3 years (April 2003 to July 2007), and it was performed at four clinical centers in Oklahoma, Arizona, and South Dakota. Study participants were 499 American Indian men and women aged  $\geq 40$  years who had type 2 diabetes but no known prior cardiovascular events. There were 252 patients randomized to aggressive target levels of LDL-C and SBP and 247 randomized to standard target levels of LDL-C and SBP. The primary end point was progression of atherosclerosis as measured by common carotid artery IMT. Secondary end points were cardiac and carotid ultrasonographic measurements and clinical events.

In the last 12 months of the study, the mean target (95% confidence interval) levels were reached in both groups, aggressive vs standard, as follows: 72 (69-75) and 104 (101-106) mg/dL for LDL-C and 117 (115-118) and 129 (128-130) mm Hg for SBP. Compared with baseline, IMT regressed in the aggressive group but progressed in the standard group ( $-0.012$  vs  $0.038$  mm;  $P < .001$ ). Carotid artery cross-sectional thickness also regressed in the aggressive group vs the standard group ( $-0.02$  mm<sup>2</sup> vs  $1.05$  mm<sup>2</sup>,  $P < .001$ ). There was also a greater decrease in left ventricular mass index in the aggressive group ( $-2.4$  g/m<sup>2.7</sup> vs  $-1.2$  g/m<sup>2.7</sup>;  $P = .03$ ). The aggressively treated group had a higher rate of adverse events and serious adverse events related to blood pressure medications. Clinical cardiovascular events did not differ significantly between the groups (1.6/100 person-years vs 1.5/100 person-years;  $P = .87$ ).

**Comment:** The study poses several dilemmas for clinicians. First, it only studied a single ethnic group, American Indians. Although the American Indian population has a high incidence of diabetes and cardiovascular events, it is unknown whether the results here can be fully extrapolated to other ethnic groups. In addition, although there were improvements in surrogate end points of atherosclerosis, such as carotid IMT, clinical events did not differ between the two groups. Indeed, there were higher adverse events related to medications in the aggressively treated group. Nevertheless, the fact that measures of atherosclerosis can be reversed with medication is very interesting and of fundamental biological importance.

#### The Rupture Rate of Large Abdominal Aortic Aneurysms: Is This Modified by Anatomic Suitability for Endovascular Repair?

Powell JT, Brown LC, Greenhalgh RM, et al; The EVAR Trial Participants. *Ann Surg* 2008;247:173-9.

**Conclusion:** The presence of diabetes, an aneurysm suitable for endovascular aneurysm repair, and statin medications may lower rupture risk of abdominal aortic aneurysm (AAA).

**Summary:** The authors used a literature review to systematically determine rupture rates of AAAs with initial diameters  $\geq 5$  cm in patients not considered for open repair. The data were stratified with respect to aneurysm diameter ( $< 6.0$  cm and  $\geq 6.0$  cm) and gender, and combined using a random-effects meta-analysis. Post-hoc analyses were also performed. The effect of gender, diabetes, initial AAA diameter, sac length, and aneurysm neck were analyzed with proportional hazards models and regression techniques. Data were also stratified by whether patients were suitable for endovascular repair (EVAR).

The authors identified two prospective, two retrospective, and one mixed study for inclusion in the meta-analysis. Patients who had AAA repair were excluded. The overall pooled rupture rate was 18.2 (95% confidence interval [CI], 13.7-24.1) per 100 patient-years. When the aneurysm increased to  $> 6.0$  cm, there was a twofold increase in rupture rate vs aneurysms  $< 6$  cm (hazard ratio [HR], 2.54; 95% CI, 1.69-3.85). Pooled rupture rates were not significantly higher in women than men. In patients suitable for EVAR from the EVAR-2 trial, rupture rate for a  $\geq 6$ -cm AAA was 17.4 (95% CI, 12.6-23.4) per 100 patient-years. This was lower than the pooled rate for all five studies (rupture rate, 27.0; 95% CI, 21.1-34.7) per 100 patient-years ( $P = .026$ ). Patients with diabetes appeared to have a lower rupture rate, and a post hoc analysis indicated that patients taking statins at baseline appeared to have about half the rupture risk compared with those not taking statins. The crude HR for rupture for patients taking statins was 0.52 (95% CI, 0.27-0.98;  $P = .044$ ).

**Comment:** There are a number of interesting findings in this meta-analysis. Rupture rates for men and women were not significantly different, suggesting that in larger aneurysms, the effect of sex differences may be overwhelmed by aneurysm diameter. In addition, short-necked aneurysms appeared to rupture more often than longer-necked aneurysms, suggesting that part of the benefit of EVAR may be due to the physical characteristics of the aneurysm suitable for EVAR. Perhaps most interesting was that post hoc analysis revealed a potentially great effect for statins in reducing the risk of AAA rupture. This last point, in particular, deserves greater investigation.

#### Results in a Consecutive Series of 83 Surgical Corrections of Symptomatic Stenotic Kinking of the Internal Carotid Artery

Illuminati G, Ricco JB, Calio FG, et al. *Surgery* 2008;143:134-9.

**Conclusion:** Surgical correction for symptomatic kinking of the internal carotid artery (ICA) is safe, effectively relieves hemispheric symptoms, and prevents stroke.

**Summary:** The authors sought to evaluate the efficacy of surgical correction of ICA kinking. Patients in this consecutive series of 81 patients (mean age, 64 years) all had hemispheric symptoms and were all on antiplatelet therapy. They underwent 83 surgical procedures to correct ICA kinking. Procedures used included shortening and reimplanting the vessel on the common carotid artery, interposition bypass grafts, or transposing the ICA onto the external carotid artery. Mean follow-up was 56 months (range, 15-135 months). The primary end points were 30-day mortality and any stroke during follow-up. There were no operative deaths. Operative stroke rate was 1%. Primary patency of the reconstruction was  $89\% \pm 4.1\%$  at 5 years. At 5 years, freedom from neurologic symptoms was  $92\% \pm 4\%$  and late survival was  $71\% \pm 6\%$ .

**Comment:** It is important to recognize what the authors are operating on and what they are not operating on. These were kinked arteries, with resulting high-grade stenotic lesions. Elongated, tortuous, or coiled arteries were not included. The article provides good technical descriptions of the operations performed to correct stenotic kinks; however, because this is basically a case series, its overall level of evidence must be considered low. One has to wonder why so many patients with this relatively odd problem ended up at a single center. Nevertheless, this is a large series by experienced surgeons and certainly worth reading. It makes one re-examine the role of high-grade ICA kinks with respect to the production of neurologic symptoms.

#### Grading Carotid Intrastent Restenosis: A Six-Year Follow-Up Study

Setacci C, Chisci E, Setacci F, et al. *Stroke* 2008;30:1189-96.

**Conclusion:** Duplex ultrasound imaging can accurately predict intrastent restenosis of stented carotid arteries.

**Summary:** The authors sought to establish duplex criteria for intrastent restenosis after carotid artery stenting (CAS). Duplex velocity parameters were compared with angiography. This was a 6-year study with data obtained prospectively. After CAS, patients underwent angiography for suspected intrastent restenosis. Stenosis was calculated according to the North American Symptomatic Carotid Endarterectomy Trial (NASCET) method. Angiographic stenosis was then compared with peak systolic velocity (PSV), end diastolic velocity (EDV), and the ratio between the peak systolic velocity of the internal carotid artery and common carotid artery (ICA/CCA). The initial duplex study was done  $\leq 48$  hours after angioplasty and served as a baseline result. Follow-up duplex examinations were performed at 30 days, 3, 6, 9, and 12 months, and then yearly. If the PSV increased greater than three times the baseline value, or if a PSV  $> 200$  cm/s was detected in the stented carotid artery, the patients underwent angiography.

There were 814 carotid stent procedures performed. There were 6427 ultrasound examinations and 1123 angiographic studies performed in follow-up. Angiographic intrastent restenosis  $> 70\%$  was detected in 22 and intrastent restenosis  $> 50\%$  in 73. On the basis of comparisons of duplex values and angiograms, velocity criteria for grading carotid intrastent restenosis were  $< 30\%$  stenosis, PSV  $\leq 104$  cm/s; 30% to 50% stenosis, PSV 105 to 174 cm/s; 50% to 70% stenosis, PSV  $\geq 175$  to 299 cm/s;  $\geq 70\%$  stenosis, PSV  $\geq 300$  cm/s, EDV  $\geq 140$  cm/s, and an ICA/CCA ratio  $\geq 3.8$ .

**Comment:** This is arguably, to date, the best article in the literature correlating angiographic findings with duplex findings in patients with intrastent carotid stenosis. It certainly has the largest numbers. It is interesting that the criteria for very-high-grade stenosis ( $> 70\%$ ) differ very little from those reasonably well accepted for native artery stenosis. More moderate lesions in stented carotid arteries, however, appear to be associated with higher PSVs than would be anticipated from comparisons of angiograms and native internal carotid artery stenoses. One relative weakness of the current study, and all studies on this subject, is the small number of patients with  $> 70\%$  angiographic restenosis, 11.7% of a total of 814 patients.

#### Competence Assessment of Senior Vascular Trainees using a Carotid Endarterectomy Bench Model

Black SA, Harrison RH, Horricks EJ, et al. *Br J Surgery* 2007; 94:1226-31.

**Conclusion:** Performance on bench models may provide information regarding the suitability of surgical trainees to proceed to operative training in a competency-based training assessment program.

**Summary:** Objective methods to assess technical competence are being introduced to surgical training. In this study the authors evaluated the value of bench top technical skills assessment using a synthetic carotid endarterectomy (CEA) model. Surgeons in training and attending vas-