

ever, benefit is small and it has been calculated that to prevent one disabling stroke over a 5-year period, approximately 32 CEAs need to be performed. Current estimates are that with best medical treatment, stroke risk can be reduced from approximately 2% per year, found in the randomized trials of CEA for asymptomatic disease, to  $\leq 1\%$  per year with current best medical management (Abbott AL. *Stroke* 2009;40:e573-e583; and Marquardt L. *Stroke* 2010;41:e11-e17). The Asymptomatic Carotid Emboli Study (ACES) found embolic signals detected with TCD on baseline recordings of 1 hour predicted stroke risk over a 2-year follow-up time (Markus HS. *Lancet Neurol* 2010;9:663-71). The current study acknowledges embolic signal detection is time consuming and sought to determine if similar predictive information could be attained from simpler recording protocols. This was a predefined secondary analysis of the ACES. The authors evaluated temporal variation of embolic signals and attempted to determine predictive yield associated with different recording protocols and/or a higher threshold level of embolic signals to indicate increased risk ( $\geq$  two embolic signals). Different recording protocols were compared using sensitivity and specificity analysis from receiver operator characteristic curves. There were 477 patients in this study with asymptomatic carotid stenosis, 467 had baseline TCD recordings adequate for analysis. Of these, 77 had embolic signals on one or both of two 1-hour baseline recordings. Embolic signal status on two recordings was significantly associated ( $P < .0001$ ). There was, however, poor agreement between embolic signal positivity on the two recordings ( $k = 0.266$ ). For the primary outcome of ipsilateral stroke or transient ischemic attack, two baseline recordings lasting 1 hour had greater predictive accuracy than either the first baseline recording alone ( $P = .0005$ ), a single 30-minute recording ( $P < .0001$ ), or two recordings lasting 30 minutes ( $P < .0001$ ). For the outcome of ipsilateral stroke 2 recordings lasting 1 hour had greater predictive accuracy when compared to all other recording protocols (all  $P < .0001$ ).

**Comment:** The elephant in the room is that if one decides to use TCD embolic signal detection to predict stroke in patients with asymptomatic carotid disease, application of the technique will be labor- and time-intensive for vascular laboratories. It will also require experienced operators and validation of commercially available embolic signal detection systems. Given the low therapeutic index for CEA for patients with asymptomatic stenosis, the time, effort, and cost may be worth it. However, it is unlikely anyone is willing going to pay for this in the foreseeable future.

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#### Patients With Severe Asymptomatic Carotid Artery Stenosis Do Not Have a Higher Risk of Stroke and Mortality After Coronary Artery Bypass Surgery

Mahmoudi M, Hill PC, Xue Z, et al. *Stroke* 2011;42:2801-5.

**Conclusion:** Severe carotid artery stenosis is not a risk factor for mortality or stroke in patients undergoing coronary artery bypass grafting (CABG).

**Summary:** Strokes complicate CABG approximately 2% of the time (Naylor AR, et al. *Eur J Vas Endovasc Surg*. 2002; 23:283-294) and most strokes complicating CABG occur within 24 hours of operation with mortality rates of up to 25%. There is, therefore, controversy as to the preferred management of patients undergoing CABG who have severe carotid artery stenosis.

The authors performed a retrospective study of 778 patients with carotid duplex ultrasound who underwent an isolated CABG procedure in their institution from January 2003 to December 2009. There were 117 patients with severe carotid artery stenosis, defined as  $>75\%$  stenosis. Patients with severe carotid artery stenosis were then compared to those without severe carotid artery stenosis ( $n = 761$ ). Data were analyzed for rates of stroke and mortality during hospitalization for CABG. 30 day mortality was also recorded. Patients with severe carotid artery stenosis had a higher prevalence of peripheral arterial disease, heart failure, and were older. However, patients with severe carotid artery stenosis had similar rates of in-hospital stroke (3.4% vs 3.6%;  $P = 1.0$ ) and mortality (3.4% vs 4.2%;  $P = 1.0$ ) compared to patients without severe carotid artery stenosis. The two groups also had similar 30-day mortality rates (3.4% for those with severe carotid artery stenosis vs 2.9% for those without severe carotid artery stenosis;  $P = .51$ ).

**Comment:** Severe carotid artery stenosis was not associated with an increased risk of in-hospital stroke, in-hospital mortality, or 30-day mortality in this study following CABG. Ricotta et al. determined the major morbidity of combining carotid endarterectomy (CEA) with CABG relates to patient comorbidities rather than the CEA (Ricotta JJ, et al. *J Vasc Surg* 2005;41:397-401). Others have found, however, similar to this study, severe carotid artery stenosis does not significantly contribute to neurologic complication rates following CABG. It would seem the preponderance of the data would suggest CEA to increase safety of CABG is an ineffective, or a t best a marginally effective, strategy. The decision to perform CEA is probably best made on individual patient circumstances irrespective of the need for coronary surgery.

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#### Transcranial Doppler Ultrasounography for Diagnosis of Cerebral Vasospasm After Aneurysmal Subarachnoid Hemorrhage: Mean Blood Flow Velocity Ratio of the Ipsilateral and Contralateral Middle Cerebral Arteries

Nakae R, Yokota H, Yoshida D, et al. *Neurosurgery* 2011;69:876-82.

**Conclusion:** The ratio of the ipsilateral to contralateral middle cerebral artery (MCA) mean blood flow velocity has better correlation with clinical meaningful consequences of cerebral vasospasm than absolute mean velocity in the MCA.

**Summary:** Transcranial Doppler (TCD) is one of the areas of non-invasive testing subject to accreditation by the Intersocietal Commission for Accreditation of Vascular Laboratories (ICAVL). Establishment of diagnostic criteria for clinically meaningful end points is important in the accreditation process. TCD is most frequently used to monitor for cerebral vasospasm. Diagnostic criteria for cerebral vasospasm focus on absolute mean velocities in the MCA or comparing of mean velocities in the ipsilateral MCA versus the ipsilateral extracranial internal carotid artery (ICA); the so called Lindgaard ratio. A recent meta-analysis concluded TCD of the MCA has a high specificity (99%), a high positive predictive value (97%), but a low sensitivity in detecting MCA vasospasm (Lysakowski C. *Stroke* 2001;32:2292-8). In an effort to improve sensitivity of TCD parameters in detecting cerebral vasospasm, the authors reviewed their patients with subarachnoid hemorrhage admitted to their institution from July 2003 to August 2009. They sought to determine the TCD parameter that was best associated with delayed cerebral ischemia defined as a neurologic deficit or CT evidence of cerebral infarction secondary to vasospasm. They used both ipsilateral and contralateral MCA mean blood flow velocities with the ipsilateral mean flow velocity defined as the side with the highest mean flow velocity and the contralateral side defined as the MCA with the lowest mean flow velocity. Receiver operator characteristic (ROC) analysis was used to determine the TCD parameter best associated with delayed cerebral ischemia. There were 142 patients retrospectively analyzed with 1262 TCD studies. ROC curve analysis showed the overall predictive value for delayed cerebral infarction had an area under the curve of 0.86 (95% CI, 0.76-0.96) when the ipsilateral mean blood flow velocity of the MCA was compared to the mean flow velocity of the contralateral MCA. The area under the curve was 0.80 (0.71-0.88) when the absolute mean MCA flow velocity was used. Discrimination between patients with and without delayed cerebral infarction was best with an ipsilateral to contralateral (I/C) mean blood flow velocity ratio of 1.5.

**Comment:** In this study, TCD had a higher sensitivity (77%) and specificity (80%) for detecting delayed cerebral ischemia when the I/C ratio of mean blood flow velocities in the MCA was used. This ratio was more closely related to clinically significant vasospasm than absolute mean blood flow velocities. It would have been interesting if the authors had also compared the proposed I/C MCA mean blood flow velocity ratio with the more commonly employed Lindgaard ratio. Confirmation of vasospasm with angiography would also have contributed positively to the robustness of the data. Nevertheless, the paper is valuable in purposing a new TCD parameter that may have increased sensitivity in detection of cerebral vasospasm.

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#### Type-Selective Benefits of Medications in Treatment of Acute Aortic Dissection (from the International Registry of Acute Aortic Dissection [IRAD])

Suzuki T, Isselbacher EM, Nienaber CA, et al. *Am J Cardiol* 2012;109:122-7.

**Conclusion:** Beta blockers are associated with improved outcomes in all types of aortic dissection patients, including those managed operatively and nonoperatively. Calcium channel blockers are associated with improved survival overall in patients with type B dissection and those managed nonoperatively. Angiotensin converting enzyme inhibitors do not have an association with mortality.

**Summary:** Medical management of aortic dissection depends primarily on opinion and historic observational studies (Hiratzka LF. *Circulation* 2010;121:e266-e369). Beta blockers are generally regarded as first-line medications and calcium channel blockers are also frequently employed. Recent studies have also suggested benefit with inhibitors of the renin angiotensin system (Swada TE. *Eur Heart J* 2009;30:2461-9). The lack of solid evidence of which drugs to employ for medical management of aortic dissection has led to disparate guidelines from various societies.

The authors analyzed data from the International Registry of Acute Aortic Dissection (IRAD) to try and better understand current approaches to medical management and the effects of medications on outcomes in patients with aortic dissection. IRAD is a multinational registry of 24 referral centers in 12 countries. The authors used data from all patients with aortic

dissection who were enrolled in IRAD from December 26, 1995 with a follow-up to 5 years who had follow-up data that included the use of medications. There were records from 1301 patients available for analysis; these included 722 with type A dissection and 572 with type B dissection. Univariate analysis demonstrated beta blockers were associated with improved survival in all patients ( $P = .03$ ), in patients with type A dissection overall ( $P = .02$ ), and in patients with a type A dissection who receive surgery ( $P = .006$ ). Calcium channel blockers were associated with improved survival in patients with type B dissection overall ( $P = .02$ ) and in patients with type B dissection receiving medical management ( $P = .03$ ). With multivariate modeling beta blockers were associated with improved survival in those with type A dissection undergoing surgery (OR, 0.47; 95% CI, 0.25 to 0.90;  $P = .02$ ) and calcium channel blockers were associated with improved survival in patients with type B dissection managed medically (OR, 0.55; 95% CI, 0.35 to 0.88;  $P = .01$ ). There was no association of angiotensin converting enzyme inhibitors with mortality.

**Comment:** The bottom line, within the limitations of the data, is that beta blockers are beneficial in all types of aortic dissection regardless of operative or nonoperative management. However, calcium channel blockers appear to be only beneficial in the medical management of type B dissection. No benefit could be found for the use of ace inhibitors in patients with aortic dissection. In patients with Marfan's syndrome, however, recent studies suggest benefit of ace inhibitors. A separate analysis of patients with Marfan's syndrome in IRAD was not performed in this study. The IRAD data predate the more widespread use of angiotensin receptor blockers. The data also did not allow authors to test the effects of drug combinations and varying dosages on mortality.

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#### Vascular Trauma in Geriatric Patients: A National Trauma Databank Review

Konstantinidis A, Inaba K, Dubose J, et al. J Trauma 2011;71:909-16.

**Conclusion:** In the geriatric patient, vascular trauma is uncommon with most injuries being blunt and the thoracic aorta the most frequently injured vessel. Vascular trauma in the geriatric patient is associated with a fourfold increase in adjusted mortality compared to vascular trauma in the nongeriatric patient.

**Summary:** There is little literature on the epidemiology of vascular injuries in elderly patients with poor documentation of diagnosis, management, and outcome of these injuries. In this study, the authors used the National Trauma Data Bank (NTDB), the largest trauma registry in the United States, to determine the epidemiology of vascular injuries in geriatric patients and to compare geriatric vascular injuries to vascular injuries in younger adults. The authors compared incidence of injury, injury mechanism, and outcome. Geriatric patients were defined as those 65 years or older. The "control" group was an adult cohort age 16 to 64 years. Vascular injuries were determined from the NTDB, version 7.0, which contains 1,861,779 medical records from 2002 to 2006. Patients were identified with the use of the International Classification of Diseases, Ninth Revision (ICD9), codes 900.0 to 904.9. Patients of unknown age were excluded.

During this study period, there were 29,736 patients with a vascular injury, 1.6% of the patients in the NTDB for the time considered. Of the patients identified with vascular injury, geriatric patients accounted for 7.6% ( $n = 2268$ ) and nongeriatric adult patients accounted for 83.1% ( $n = 24,703$ ). Geriatric vascular injury patients had a higher injury severity score compared to nongeriatric vascular injury patients ( $26.6 \pm 17$  vs  $21.3 \pm 16.7$ ;  $P < .001$ ). Geriatric patients were less frequently victims of penetrating injuries (16.1% vs 54.1%;  $P < .001$ ). The thoracic aorta, innominate and subclavian vessels, and other vessels of the chest were the most commonly injured vessels in the elderly ( $n = 637$ , 40.2%). The incidence of thoracic aortic injuries was higher in geriatric patients compared to nongeriatric patients (33.0% vs 13.9%;  $P < .001$ ). This incidence increased linearly with age. Adjusting for confounding variables, geriatric patients had a fourfold increase in mortality following vascular injuries (OR, 3.9; 95%CI, 3.32-4.58;  $P < .001$ ). The most common mechanism of injury in the geriatric patient was a motor vehicle accident, with falls being the second most common mechanism of injury.

**Comment:** This is likely the largest examination of the epidemiology of geriatric vascular trauma available. There are obvious limitations. The study is retrospective and dependent on accurate data from more than 900 trauma centers in the NTDB. Nevertheless, we can conclude vascular trauma in the elderly is infrequent compared to younger patients, there is predominately a blunt mechanism of vascular trauma in the elderly, the thoracic aorta is the most frequently injured vessel, and there is the increased relative mortality of vascular injury in the elderly.

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