Methods: Various grades of stenosis were created by adhering different amounts of silicone rubber sealant onto the inner wall of clear, radiolucent tubes. Following CTA, MRA and DSA, the tubes were transected with 1-mm interval through the plaques. The cross-sectional areas were digitally photographed, and the percentage of area reduction of every single slide was measured using ImageJ planimetric software (Figure 1). The maximum actual area reduction (AAR) stenosis of each tube was recorded. The differences among CTA, MRA, DSA, and AAR were compared statistically.

Results: Overall, CTA and MRA significantly underestimated the degrees of stenosis compared with AAR ($p=0.001$ and $p=0.0009$, respectively), and no significant difference between DSA and AAR ($p=3.98$). In the subgroup with stenosis less than 70%, there was no significant difference between CTA, MRA, and DSA versus AAR ($p=0.16$, $p=0.08$, and $p=1.76$, respectively). In the subgroup with severe stenosis over 70%, CTA and MRA significantly underestimated the stenosis versus AAR ($p=0.004$, and $p=0.007$ respectively); and DSA significantly overestimated the stenosis ($p=0.0007$).

Conclusions: CTA, MRA, and DSA are consistent with AAR in grading of mild to moderate stenosis. CTA and MRA significantly underestimate, but DSA significantly overestimates the percentages of severe stenotic lesions. Morphology of carotid plaques may affect the accuracy of imaging studies. Clinical correlation need to be investigated.

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PS90.

Practice Guidelines to Help Reduce Microembolic Events Following Carotid Artery Stenting

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Objectives: Post-procedure microembolization demonstrated on diffusion weighted MRI (DWI) has emerged into a promising outcome measure for carotid interventions. We previously demonstrated that technical modifications to our carotid stenting (CAS) program can reduce microembolization. We sought to examine the impact of these modifications on the incidence of microemboli in patients who receive carotid revascularization procedures.

Methods: From 7/2004 to 6/2010, a total of 228 consecutive patients (143 CEA and 85 CAS) who underwent carotid interventions also received pre- and postoperative MRI evaluations in a single academic institution. Prior to January 2007 (Period1) 41 patients underwent CAS. After January 2007 (Period2), CAS was performed using a closed-cell system, early heparinization, minimal arch manipulation, and involvement of experienced physicians. Hospital records for all patients were reviewed for comorbidities, lesion characteristics, procedural information, postoperative outcomes, and incidence of postprocedural microemboli.

Results: Forty (47%) CAS patients compared to 15 (10%) CEA patients had acute microemboli on postprocedural DWI ($P<0.001$), and also had a higher incidence of contralateral microembolization ($P=0.01$,OR6). In Period1 the incidence of microemboli in CAS patients was 59%, and in Period2 it was reduced to 36% ($P=0.01$). Multivariant analysis demonstrated that the strongest predictors of microembolization after CAS or CEA were BMI>30 ($P=0.001$,OR11), history of coronary artery disease ($P=0.027$,OR5), or the detection of infarcts on preoperative MRI, ($P=0.006$,OR8).

Conclusions: Although the incidence of microembolic events following CAS is higher compared to CEA, procedural modifications to CAS along with appropriate patient selection can help significantly decrease its occurrence. Further investigational use of periprocedural DWI is needed to determine the utility and cost-effectiveness of identifying patients at risk of microembolic events.

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PS92.

Increased Risk of Adverse Events in Physiologically High-Risk Patients Undergoing Carotid Artery Stenting

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Objectives: The current Center for Medicare and Medicaid Services (CMS) guidelines offer stenting as an alternative largely in symptomatic patients with high-grade stenosis considered "high risk" for carotid endarterectomy (CEA). We stratified patients who underwent carotid artery stenting (CAS) by CMS inclusion criteria and compared their outcomes.

Methods: A retrospective chart review of all CAS procedures from 2001 through 2010 at our institution was performed. Patients were identified using the SVS Registry and electronic hospital records using ICD-9 codes and stratified according to CMS risk factors. Data analysis included multivariate logistic regression using physiologic high-risk status, anatomic high-risk status, symptom status, and gender as predictors. Combined 30-day CVA/TIA, death, or MI served as the primary outcome.

Results: Three hundred and seven CAS patients were identified, of which 190 were considered high-risk (62%), 101 were physiologically high-risk (53%), 63 were anatomically high-risk (33%), and 26 were both (14%). Ninety-six patients were symptomatic (31%). Twenty-three patients suffered complications (7.5%), including 9 CVAs (2.9%), 8 TIAs (2.6%), 4 MIs (1.3%), and 4 deaths (1.3%). Independent predictors of CVA/TIA, death, or MI were physiologic high-risk status, symptomatic status, and male gender, while anatomic high-risk status was not (Table 1).

Conclusions: Current CMS physiologic high-risk CEA criteria place patients at increased risk for adverse events for CAS. This warrants the need for improved patient selection criteria for CAS vs. CEA in physiologically high-risk patients.

Table 1. Results of multivariate logistic regression analysis

	OR	*CI*	*p-Value*
HR (Physiologic)	2.54	1.01-6.42	0.047
HR (Anatomic)	1.02	0.39-2.67	0.96
Symptomatic	3.77	1.54-9.26	0.004
Male Gender	3.22	1.04-9.95	0.042

HR, high-risk; OR, odds ratio; CI, confidence interval.

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PS94.

Postoperative Transcranial Doppler Monitoring in the Prediction of Cerebral Hyperperfusion after Carotid Endarterectomy

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Objectives: Cerebral hyperperfusion syndrome (CHS) following carotid endarterectomy (CEA) is defined by a combination of symptoms and at least a doubling of preoperative cerebral blood flow, correlated to a doubling of the mean blood velocity (Vmean) measured in the ipsilateral middle cerebral artery with transcranial Doppler (TCD). Currently, an increase in Vmean of >100% 3 minutes after carotid declamping, compared to pre-clamping Vmean is the gold standard for CHS prediction. However, applying this method, not all patients at risk for CHS are identified, while others may be treated unnecessarily. We hypothesize that the positive predictive value (PPV) of TCD in the prediction of CHS can be increased by an additional post-operative TCD measurement within two hours after CEA.

Methods: In 184 CEA patients the pre-operative (V1), pre-clamping (V2), post-clamping (V3) and post-operative Vmean (V4) was measured by TCD and standard blood pressures were scored. The intra-operative Vmean increase ((V3 - V2) / V2) was compared to the post-operative increase ((V4 - V1)/ V1) in relation to CHS and post-operative hypertension. Outcome was reported as PPV and ROC-curve analysis.

Results: An intra-operative Vmean increase of >100% was noted in 16 patients (9%), and a post-operative Vmean increase in 22 (12%) patients. In 10 patients (5%) CHS was diagnosed; two of those had an intra-operative Vmean increase of >100% and nine a post-operative Vmean increase >100%. This results in a PPV of 13% for the intra-operative and 41% for the postoperative measurement, and a PPV of 29% if both measurements were combined.

ROC curve analysis showed an area under the curve of 0.641 for the intra-operative and 0.904 for the post-operative Vmean measurement method.

Conclusions: A post-operative Vmean increase of >100% as measured by TCD is superior to both the intra-operative and the combined intra- and post-operative TCD measurement for the identification of patients at risk for the development of CHS after CEA.

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PS96.

Hospital Economics of Carotid Endarterectomy and Carotid Stenting

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Objectives: Cost-effectiveness has become an important endpoint in comparing therapies considered to have clinical equipoise. Prior economic analysis of carotid artery treatment has been limited by small sample size.

Methods: A retrospective analysis of hospital cost and 30 day clinical outcomes was performed on patient undergoing carotid endarterectomy (CEA) and carotid stenting with (CAS) between 1/1/08 - 9/30/10 at a single insti-