Carotid Revascularization Endarterectomy versus Stenting Trial (CREST) trial showed that carotid stenting can be performed with an equivalent major event rate compared with carotid endarterectomy. However, there is still controversy regarding the training and experience required to safely perform this procedure. This observational study examined the performance of carotid stenting with regard to specialty and case volume.

Methods: From 2004 to 2011, data for patients diagnosed with carotid stenosis who had a carotid stenting procedure were extracted from the Nationwide Inpatient Sample database. The cohort was separated based on the provider performing the procedure (surgeon vs interventionalist), hospital location, and volume. Surgeons were defined as providers who also performed a carotid endarterectomy or femoral-popliteal bypass during the same time interval. Primary end points analyzed included stroke, myocardial infarction, 30-day mortality. Length of stay and hospital costs were also analyzed as secondary outcomes.

Results: A total of 20,663 cases of carotid stenting were found, of which 15,305 (74%) were identified to have been performed by a "surgeon," whereas 5358 (26%) were done by an "interventionalist." Most cases were done at hospitals in urban locations (96.51%) and designated teaching institutions (61.47%). Unadjusted outcomes were similar between surgeons and interventionalist in stroke (4.33% and 4.41%), myocardial infarction (2.10% and 2.13%), and mortality (0.84% and 1.03%), respectively. Qualitatively, volume per 10 cases was shown to decrease the risk of stroke. Adjusted multivariate analysis demonstrated no statistical significance between the primary end point outcomes. However, length of stay (2.81 vs 3.08 days) and total charges ($48,087.61 vs $51,718.77) were lower for procedures performed by surgeons (Table).

Conclusions: Surgeons are performing the majority of carotid stent procedures in the United States. The volume of cases performed by a provider, rather than the provider's specialty, appears to be a stronger predictor of adverse outcomes for carotid stenting. There was, however, significant cost differences between surgeons and interventionalists, which needs to be further evaluated at an institutional level.

Table. Carotid stent outcomes based on provider and hospital volume

Variable	*Adjusted risk/mean (95% CI)*	P
In-hospital mortality		
Interventionist vs surgeon	1.29 (0.90-1.84)	.1728
10-unit volume difference	1.01 (0.96-1.05)	.7767
Stroke (CVA)		
Interventionist vs surgeon	1.00 (0.84-1.19)	.9819
10-unit volume difference	0.97 (0.94-0.99)	<.005
Myocardial infarction		
Interventionist vs surgeon	1.14 (0.90-1.43)	.2803
10-unit volume difference	0.99 (0.96-1.02)	.6010
Length of stay, days		
Interventionist vs surgeon	0.29 (0.14-0.44)	<.005
10-unit volume difference	−0.05 (−0.06 to −0.04)	.0000
Total charge, $		
Interventionist vs surgeon	2943.90 (1321.96-4565.84)	<.005
10-unit volume difference	98.39 (−55.77 to 252.55)	.2110

CI, Confidence interval; *CVA,* cerebrovascular accident.

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Predictors and Consequences of Hemodynamic Instability Following Carotid Artery Stenting

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Objective: To determine the predictors and consequences of hemodynamic instability (HI) after carotid artery stenting (CAS).

Methods: The records of all patients undergoing CAS in a single institution were reviewed. Patient demographics and risk factors were recorded. Indications for CAS, medications (ie, statins, atropine, and β-blockers), anatomic risk factors, balloon and stent length and diameter, as well as degree of stenosis were noted. The presence of periprocedural hypertension (systolic blood pressure >180 mm Hg), hypotension (systolic blood pressure <90 mm Hg), and bradycardia (heart rate <60 beats/min) lasting >1 hour was documented, as was more transient HI. Rates of transient ischemic attack (TIA), stroke, myocardial infarction, and death within 30 days of the procedure were calculated. χ^2 Analysis was used to determine the role of periprocedural factors in predicting the risk of HI and to determine if patients experiencing HI were more likely to suffer major adverse events (MAE) than those who did not.

Results: Between 2005 and 2012, 199 CAS were performed in 191 patients (117 men, 74 women). Their mean age was 73.6 years (range, 46-92 years), and 87% had hypertension, 48.5% were smokers, 48% had coronary disease, and 38% were diabetic. CAS was performed for asymptomatic stenosis in 56% of patients, 24% had previous TIA, and 20% had previous stroke. Statins were used by 63% of patients, β-blockers by 41.4%, and 92% received atropine before balloon dilatation or stent placement. Overall, 130 patients (65.3%) experienced HI, and 67 (33.7%) experienced HI lasting >1 hour. Octogenarians were more likely to suffer both transient and prolonged HI, angina or contralateral occlusion were associated with an increase in overall HI, and female sex was predictive of prolonged HI alone. Transient HI was not predictive of MAE. Patients with HI persisting >1 hour were more likely to suffer a TIA than those who did not (P = .045), but they were no more likely to experience stroke, myocardial infarction, or death (P > .35 for each).

Conclusions: Periprocedural HI occurs frequently during CAS, even with prophylactic atropine administration. Although patients experiencing HI were more likely to suffer a TIA, its presence is not associated with an increase in stroke, myocardial infarction, or death.

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Cranial Nerve Injury (CNI) in the Carotid Revascularization Endarterectomy versus Stenting Trial (CREST): Incidence, Outcomes and Quality of Life

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Objectives: Cranial nerve injury (CNI) is the most common neurologic complication of carotid endarterectomy (CEA) and can cause significant chronic disability. Nonetheless, data from prior randomized trials are limited. The incidence of CNI, baseline and procedural characteristics, outcomes, and quality of life (QOL) scores were evaluated in 1151 patients randomized to CEA.

Methods: Patients with CNI were identified and classified using Case Report Forms, adverse event data, and clinical notes. Baseline and procedural characteristics were compared using descriptive statistics. Clinical outcomes at 1 and 12 months were analyzed. All data were adjudicated by two neurologists and a vascular surgeon. QOL was evaluated using the SF-36 to assess general health and Likert scales for disease specific outcomes at 2 weeks, 4 weeks, and 12 months after CEA. The effect of CNI on SF-36 subscales was evaluated using random effects growth curve models, and Likert scale data was compared by logistic regression.

Results: CNI was identified in 53 patients (4.6%). Nerves injured were VII in 30.2%, XII in 24.5%, IX/X in 41.5%, and 3.8% had Horner syndrome. No baseline or procedural factors were predictive of CNI. Deficits resolved in 18 patients (34%) at 1 month and in 41 of 51 patients (80.4%) with 1-year follow-up. One-year outcome could not be determined in 2 patients. Classifying those patients as unresolved results in persistent CNI in 22.6% of patients at 1 year. QOL evaluation by SF-36 showed no statistical difference between groups with and without CNI at 2 weeks, 4 weeks, and 1 year. By Likert scale analysis, the group with CNI showed a significant difference in the difficulty eating/swallowing parameter at 2 and 4 weeks but not at 1 year (P = .0001).

Conclusions: In CREST, CNI occurred in 4.6% of patients undergoing CEA, with 34% resolution at 30 days and 77.4% at 1 year. CNI had a small effect on QOL, negatively impacting only difficulty eating/swallowing at 2 and 4 weeks but not at 1 year.

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The Pulseless Limb in War Trauma: Does It Predict an Arterial Injury?

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