After excluding five regions for insufficient volume (<200 HDA), 12,721 HDA across 11 regions were available for analysis. A total of 2378 BVT were created.

Results: HDA performed as an outpatient varied from 53.4% to 97.9%. General anesthesia use varied from 1.9% to 74.4%. Preoperative venous imaging, by ultrasound or venogram, varied from 72.1% to 95.9%. Native arteriovenous fistula (AVF) vs non-AVF varied from 58% to 85.1%. Inadequate vein was cited in 68% of non-AVF cases. Distribution of upper extremity AVF type across regions varied widely (Fig). The incidence of BVT2 varied from 5.5% to 82.8%. Univariable analysis of BVT demonstrated the mean vein diameter for BVT2 was significantly smaller than BVT1 (3.5 mm vs 4.3 mm). Females were more likely to undergo BVT2 (59% vs 49%). Patients with coronary artery disease (CAD; 46% vs 56%) or chronic obstructive pulmonary disease (45% vs 56%) were less likely to undergo BVT2. On multivariable analysis, female gender (odds ratio [OR], 1.25) was independently associated with BVT2, while increasing vein size (OR, 0.71) and any CAD (OR, 0.71) were independently associated with a decreased likelihood of undergoing BVT2.

Conclusions: Considerable variation exists within the VQI database in the practice patterns of hemodialysis access operations. Given the increasing health policy focus on outcomes of hemodialysis access operations in the United States, further study is required to determine if regional variations in practice patterns contribute to vascular access outcomes and patient morbidity and mortality.

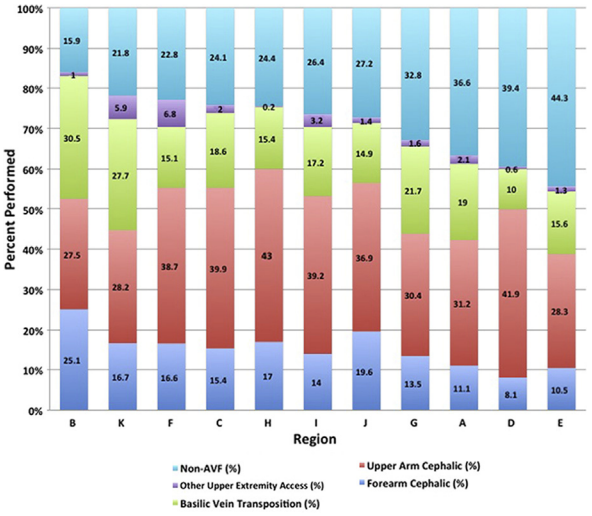

Fig.

Author Disclosures: J. C. Dunn: Nothing to disclose; **V. Rowe**: Nothing to disclose; **K. Woo**: Nothing to disclose.

PC108.

Comparison of Management Strategies for Asymptomatic Carotid Artery Stenosis

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Objectives: Previous studies suggest an increased incidence of stroke following carotid angioplasty and stenting (CAS) compared with carotid endarterectomy (CEA) in the management of asymptomatic carotid artery stenosis (ACAS), particularly in the elderly.

Methods: The 2012 Nationwide Inpatient Sample was queried for data on admissions with a primary diagnosis of ACAS undergoing a primary procedure of CEA or CAS. Stepwise multivariable regression analyses were used to identify the independent significance of procedure type in predicting outcomes.

Results: We identified 17,344 admissions with ACAS during the study period that underwent CEA (14,722 [84.8%]) or CAS (2679 [15.2%]). No difference in age was seen (70.9 vs 71.2 years, $P = .20$). Caucasian race (88.8% vs 85.3%, $P < .001$) and female gender (42.4% vs 38.5%, $P < .001$) were more common in the CEA group. Cardiac (11.2% vs 6.6%, $P < .001$) and renal (13% vs 9.6%, $P < .001$) comorbidities were more common in the CAS group. There was no difference in postoperative myocardial infarction (1.4% vs 1.6%, $P = .48$) or in-hospital mortality (0.2% vs 0.2%, $P = .65$). Postoperative stroke was significantly higher in the CAS group (2.4% vs 1.2%, $P < .001$), as was the major adverse event rate (3.9% vs 2.7%, $P < .001$). Median hospital charges were greater for the CAS group ($44,363 vs $27,047, $P < .001$). Multivariable regression analysis identified CAS as an independent predictor of stroke (odds ratio; 95% 1.95; 95% confidence interval, 1.45-2.62) and hospital charges (B = $16,496.24; $P < .001$).

Conclusions: CAS for ACAS is associated with higher stroke risk and hospital charges than CEA.

Author Disclosures: A. Aggarwal: Nothing to disclose; **D. Patel**: Nothing to disclose; **A. M. Maselli**: Nothing to disclose; **M. Shapiro**: Nothing to disclose; **D. A. Risucci**: Nothing to disclose; **M. D'Ayala**: Nothing to disclose.

PC110.

Predictors of Neurovascular Complications in Carotid Body Tumor Resection

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Objectives: We conducted a large, multi-institutional study to assess the neurovascular complications in patients undergoing carotid body tumor (CBT) excision. Comparisons of outcomes were made based on Shamblin classification, distance from the base of the skull (BOS), and use of preoperative embolization (EMB).

Methods: A standardized database by a consortium of 14 institutions was used to assess patients who underwent surgical excision of CBT after cross-sectional imaging and subsequent Shamblin classification over a 10-year period (2004-2014). All measurements were made using computed tomography (CT)/magnetic resonance (MR) and/or ultrasound, and volume was calculated by ellipsoid approximation using two diameters measured from imaging.

Table. Comparison of Shamblin I, II, and III carotid body tumors (*CBTs*)

	All CBTs (n = 295)	*Shamblin I (n = 101)*	*Shamblin II (n = 125)*	*Shamblin III (n = 69)*	
Variables	*Mean (SD, range)*	*Mean (SD, range)*	*Mean (SD, range)*	*Mean (SD, range)*	P
Maximal diameter, cm	3.90 (1.77, 1-15)	2.69 (1.03, 1-8)	4.10 (1.40, 1.75-11.3)	4.99 (1.48, 1.4-8)	<.001
Volume, cm^3	30.8 (97 0, .0.131-1539)	8.98 (14.6, 0.131-106)	26.4 (28.3, 1.43-160)	44 9 (42.5, 1.06-205)	<.001
Distance to BOS	3.41 (2.08, 0-10)	3.38 (1.65, 0-10)	3.70 (2.20, 0-10)	3.07 (2.32, 0-9)	.588
EBL, mL	248 (430, 0-3500)	149 (247, 0-2300)	237 (386, 10-2400)	436 (436, 0-3500)	<.001
	No. (%)	*No. (%)*	*No. (%)*	*No. (%)*	
Preoperative EMB	64 (22)	7 (7)	36 (29)	21 (30)	<.001
Vascular reconstruction	13 (4)	1 (1)	4 (3)	11 (16)	<.001
ECA ligation	33 (11)	4 (4)	10 (8)	18 (26)	<.001
CN injury	69 (23)	8 (8)	30 (24)	29 (42)	<.001
Temporary	44 (15)	6 (6)	18 (14)	19 (28)	<.001
Permanent	25 (8)	2 (2)	12 (10)	10 (14)	.003

BOS, Base of skull; *CN*, cranial nerve; *EBL*, estimated blood loss; *ECA*, external carotid artery; *EMB*, embolization.

Results: A total of 302 CBTs were excised in 293 patients (73% female; mean age, 52 years); 34% were Shamblin I, 42% were Shamblin II, and 24% were Shamblin III. The mean diameter was 3.8 cm (range, 1-11.3 cm) and mean volume was 25 cm^3 (range, 0.1-205 cm^3). Twenty-three percent had cranial nerve (CN) injuries. Patients with higher Shamblin class had more bleeding, temporary CN injuries, and vascular reconstruction (Table). Shorter distance to BOS was associated with increased bleeding ($P = .02$) and permanent CN injury ($P = .002$). Patients with and without EMB (22% and 78%, respectively) had no difference in CBT size, but EMB patients had significantly shorter distance to BOS (2.3 vs 3.7 cm; $P = .001$). After adjusting for tumor size and distance to BOS, EMB was not associated with decreased bleeding (mean estimated blood loss, 209 vs 257 mL; $P = .78$); however, it was associated with increased operative time (192 vs 141 minutes; $P = .01$) and CN injuries (22% vs 13%; $P = .003$).

Conclusions: This large study of CBTs demonstrates the importance of determining distance from the top of a CBT to the BOS as well as Shamblin classification. Shamblin classification predicts the need for vascular reconstruction, and the risk of bleeding and temporary nerve injury, while distance to BOS predicts bleeding risk and permanent nerve injury. Preoperative embolization is more often performed for CBTs located higher in the neck, but may not reduce bleeding in CBTs that are located lower in the neck. Distance to BOS should be calculated in all patients with CBTs to provide precise preoperative counseling of risks.

Author Disclosures: G. Y. Kim: Nothing to disclose; **P. F. Lawrence**: Nothing to disclose; **A. Munoz**: Nothing to disclose; **G. S. Oderich**: W. L. Gore, Cook Medical, consulting fee; Cook Medical, contracted research; **K. Luna-Ortiz**: Nothing to disclose; **S. Farley**: Nothing to disclose; **R. S. Moridzadeh**: Nothing to disclose; **Vascular Low Frequency Disease Consortium Collaborators**: Nothing to disclose.

PC112.

Long-Term Outcomes After Carotid Revascularization in Patients on Hemodialysis

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Objectives: Existing reports of outcomes after carotid endarterectomy (CEA) and carotid artery stenting (CAS) in patients on hemodialysis (HD) are limited to small, single-institution studies. We compare long-term outcomes after CEA and CAS among a large nationally representative cohort of HD patients.

Methods: We studied all patients on HD who underwent CEA and CAS in the United States Renal Disease System (USRDS) database between January 2006 and December 2011. Patient data were linked to the Medicare database to capture long-term outcomes. Univariable, multivariable Cox regression, and propensity score-matched analyses were used to compare perioperative (stroke, death, myocardial infarction [MI]) and long-term (stroke and death) outcomes after CAS vs CEA.

Results: There were 6183 carotid revascularizations performed (CEA: 5121; CAS: 1062). Mean age was 67 ± 10 years, and the majority of patients were male (60%), white (76%), and asymptomatic (CEA: 83%; CAS: 83%). Mean follow-up was 1.6 ± 1.3 years. Perioperative stroke, death, and MI occurred in 3.2%, 4.6%, and 3.2% of patients, respectively, after CEA, and 5.5%, 5.5% and 3.5%, respectively, after CAS (Table). There was a significantly higher risk of perioperative stroke after CAS compared with CEA (propensity score matched $P < .05$). Symptomatic status was a significant predictor of perioperative stroke (odds ratio, 1.92; 95% confidence interval, 1.33-2.77; $P < .001$). Stroke-free survival

Table. Outcomes comparing carotid artery stenting (CAS) to carotid endarterectomy (CEA) among patients on hemodialysis

Outcome	*Unadjusted, OR (95% C1)*	P *value*	*Adjusted, OR (95% CI)*	P *value*
Perioperative period				
Stroke	1.87 (1.38-2.53)	<0.001	1.80 (1.25-2.59)	0.002
MI	1.21 (0.90-1.63)	NS	1.17 (0.82-1.66)	NS
Death	1.10 (0.77-1.59)	NS	1.23 (0.78-1.95)	NS
Stroke or death	1.46 (1.15-1.87)	0.002	1.50 (1.11-2.02)	0.009
Long-term				
Stroke	1.17 (0.94-1.47)	NS	1.13 (0.86-1.48)	NS
Death	1.00 (0.68-1.45)	NS	1.14 (0.71-1.81)	NS

CI, Confidence interval; *NS*, not significant; *OR*, odds ratio.