CEA alone was performed in 581 symptomatic patients (32%) and in 1233 asymptomatic patients (68%). Stroke/death/MI was 4.5% (2.8%/0.5%/1.2%) for symptomatic patients and 4.0% (2.4%/0.4%/1.1%) for asymptomatic patients. CEA and coronary artery bypass grafting (CABG) was performed in 155 patients (98.7% asymptomatic), S/D/MI of 11.1% (3.9%/5.8/%1.3%). Of 332 patients, CAS was performed in 119 symptomatic patients (36%) and in 213 asymptomatic patients (64%), with 255 (77%) treated as part of a Food and Drug Administration-approved trial. S/D/MI was 9.2% (4.2%/4.2%/0.8%) for symptomatic patients and 5.2% (3.3%/1.4%/0.4%) for asymptomatic patients. Symptomatic CAS patients treated in a clinical trial (n = 64) had two events—S/D/MI of 3.1% (3.1%/0%/0%). Symptomatic patients treated outside a clinical trial (n = 55) had nine events—S/D/MI of 16.4% (5.5%/9%/1/1.8%).

Conclusions: (1). The prospectively collected, independently verified S/D/MI rates for all CEA and CAS performed within a clinical trial were equivalent to the CREST results. (2) S/D/MI for CAS in symptomatic patients was significantly higher than CEA (9.2% vs 4.5%; $P = .034$). (3). S/D/MI for CAS in symptomatic patients within a clinical trial was equivalent to CEA (3.1% vs 4.5%; $P = .759$). Symptomatic CAS patients who did not qualify for a clinical trial had a five times increased risk of S/D/MI of 16.4%. (4) S/D/MI for CAS in asymptomatic patients was equivalent to CEA (5.2% vs 4.0%; $P = .42$). (5). CEA/CABG in asymptomatic patients is associated with a three-times increased risk of S/D/MI compared with patients undergoing CEA for asymptomatic disease.

Author Disclosures: J. Hirsch: Nothing to disclose; **M. Jaff**: Abbott, Silk Road, Boston Scientific, Covidien, and Medtronic, consulting fees or other remuneration (payment); **C. J. Kwolek**: Silk Road, Cordis, W. L. Gore, and Abbott, research grants; **V. I. Patel**: Nothing to disclose; **G. Rordorf**: Nothing to disclose; **K. Rosenfield**: Abbott, Medtronic, and Lutonix, research grants.

VESS8.

Kinematics Effectively Delineate Accomplished Users of Endovascular Robotics Using a Physical Training Model

Cassidy Duran[1], Sean Estrada[2], Marcia O'Malley[2], Jean Bismuth[1]. [1]The Methodist DeBakey Heart & Vascular Center, Houston, Tex; [2]Rice University, Houston, Tex

Objectives: Endovascular robotics systems, now approved for clinical use in the United States and Europe, are seeing rapid growth in interest. Determining who has sufficient expertise for safe and effective clinical use remains elusive. Our aim was to analyze performance on a robotic platform to determine what defines an expert user.

Methods: Over three sessions, 20 subjects with a range of endovascular expertise and endovascular robotic experience (novices <2 hours to moderate-extensive experience with >20 hours), performed four tasks on a training model. All participants completed a 2-hour training session on the robot by a certified instructor. Electromagnetic tracking was used to capture and analyze catheter tip motion. Motion analysis was based on derivations of speed and position, including spectral arc length and total number of submovements (inversely proportional to proficiency of motion) and duration of submovements (directly proportional to proficiency).

Results: There was no significant difference in completion times between novices and experienced users. The experienced users had more efficient motion and performed more consistently. Users with >20 hours performed significantly better than those new to the system, independent of standard endovascular experience (Table).

Conclusions: Expertise in performance of traditional manual endovascular interventions does not translate to performance on the endovascular robot. Efficiency of catheter movement and consistency of performance may help identify users who are sufficiently trained for safe clinical use of the system. This work will help identify the learning curve and specific movements that translate to expert robotic navigation.

Table. Motion metrics for robotic task performance

	Competent	*Noncompetent*	P
Spectral arc length, mean mm	18.18	28.82	<.0001
Submovements			
Mean number per sec	0.415	0.642	<.0001
Mean duration, sec	3.27	1.77	<.0001

Author Disclosures: J. Bismuth: Hansen Medical, consulting fees or other remuneration (payment); **C. Duran**: Nothing to disclose; **S. Estrada**: Nothing to disclose; **M. O'Malley**: Nothing to disclose.

VESS9.

Surgical Aneurysmorrhaphy to Preserve Autogenous Arteriovenous Fistula (aAVF) With Aneurysm-Related Complications

Trung Vo, Gloria Tumbaga, Paul Aka, Jeffrey Hsu, Jason Behseresht, Majid Tayyarah. Kaiser Permanente Fontana, Fontana, Calif

Objectives: Aneurysm related complications can result in lost of a functioning autogenous arteriovenous fistula (aAVF). We reviewed our results with aneurysmorrhaphy to preserve and extend the aAVF use span.

Methods: Over the past 6-year period, we retrospectively reviewed the surgical outcome in patients with an aAVF who presented with aneurysm-related bleeding, infection, and/or skin erosion. Of 50 patients who were identified, 36 (72%) underwent aneurysmorrhaphy. The operation involves resecting the redundant aneurysm wall along with compromised skin and primarily remodeling the remaining vein to create a conduit 6 to 8 mm in diameter.

Results: Thirty-four of 36 (94%) complicated AVFs were successfully repaired primarily with aneurysmorrhaphy. Median patient age was 65.5 years (range, 29-88 years). Median AVF age was 61.5 months (range, 12-136 months). Median patient follow-up was 15.5 months (range, 1-76 months). Seventy-five percent of patients had at least 9 months of follow-up, and 25% had at least 28 months. Primary patency was 67% and 57%, assisted primary patency was 85% and 80%, and secondary patency was 89% and 89% at 1 and 2 years, respectively. Local regional

anesthesia was used for 67% of the repairs compared with 33% done under general anesthesia.

Conclusions: This is the largest number of reported case series in patients with aAVF aneurysmal-related complications who underwent aneurysmorrhaphy. Surgical aneurysmorrhaphy is a highly successful repair that will preserve the native AVF and extend its functional life with very low complications. Diligence has to be taken to evaluate and treat for central venous stenosis to maintain use of the AVF and prevent recurrence of further aneurysms.

Author Disclosures: P. Aka: Nothing to disclose; **J. Behseresht**: Nothing to disclose; **J. Hsu**: Nothing to disclose; **M. Tayyarah**: Nothing to disclose; **G. Tumbaga**: Nothing to disclose; **T. Vo**: Nothing to disclose.

VESS10.

Management of the Failing AV Access

Justyna Rzucidlo[1], Christopher Banko[1], Rami Bustami[2], Clifford M. Sales[2]. [1]The Cardiovascular Care Group, Westfield, NJ; [2]Overlook Medical Center, Summit, NJ

Objectives: Avoidance of stents within the venous circuit of an arteriovenous (AV) access is well accepted. The challenge facing the access surgeon in caring for the patient with a failing hemodialysis access is to determine the optimal time to create a new access. We reviewed our data, with our "stent-aversion" policy in an effort to answer this question.

Methods: Data from consecutive patients treated in our facility from May 2012 to September 2013 were reviewed. Time to first AV access failure was measured as the time between the date of the procedure and failure or last follow-up. The proportion of AV access failure was compared in the two groups using the χ^2 test. A Cox proportional hazards regression model was used to evaluate the risk of failure by group.

Results: A total of 170 patients had complete data available for review. Ninety-two patients (54%) were treated with angioplasty alone, and 78 (46%) underwent angioplasty and stent placement. Patency was continually evaluated, and all patients underwent a clinical examination at 90 days with fistulography used as needed. Average age was 66.9 years (standard deviation, 13.9), with 51% males. Median follow-up time was 8.5 months. The overall proportion of failure was 19%: 12% in the angioplasty group vs 27% in the stent group ($P = .013$. Results from Cox regression showed that patients in the stent group had significantly higher risk of failure (hazard ratio, 2.47; 95% confidence interval, 1.15-5.33; $P = .021$). Higher risk of failure was also significantly associated with increased number of comorbidities (hazard ratio, 1.40; $P = .020$). Kaplan Meier results showed that the 9-month failure rate was 12% in angioplasty group vs 33% in the stent group.

Conclusions: This review confirms the inferiority of stents in the management of the failing hemodialysis access. We advocate for the planning of new access creation at the time a stent is placed into the AV access circuit to reduce the need for further interventions.

Author Disclosures: C. Banko: Nothing to disclose; **R. Bustami**: Nothing to disclose; **J. Rzucidlo**: Nothing to disclose; **C. M. Sales**: Nothing to disclose.

VESS11.

Postoperative Surveillance and Long-term Outcomes After Endovascular Aneurysm Repair Among Medicare Beneficiaries

Trit Garg, Laurence C. Baker, Matthew W. Mell. Vascular Surgery, Stanford University, Stanford, Calif

Objectives: The Society for Vascular Surgery (SVS) recommends annual imaging after endovascular aneurysm repair (EVAR). We sought to describe adherence to these surveillance guidelines and determine the association between adherence and long-term outcomes.

Methods: We analyzed fee-for-service Medicare claims for patients receiving EVAR from 2002 to 2005, collecting all relevant postoperative images through 2011. Allowing for a grace period of 3 months, we defined complete surveillance as at least one CT or ultrasound assessment every 15 months after EVAR. Outcomes included all-cause mortality, late rupture, and complications (conversion to open, proximal or distal extension cuff, angioplasty, or embolization).

Results: Our cohort comprised 9503 patients. Median follow-up duration was 5.5 (interquartile range, 2.6-7.2) years. Incomplete surveillance was observed in 54.7% of patients, and was observed at 3.2 ± 1.7 years after EVAR. Patients with incomplete surveillance had lower all-cause mortality (45.8% vs 68.2%, $P < .001$), fewer late ruptures (0.8% vs 1.4%, $P = .003$), and fewer complications (1.6% vs 6.2%, $P < .001$). Aneurysm-related mortality was equivalent (0.7%) for both groups and was not associated with incomplete surveillance by multivariable logistic regression (adjusted odds ratio, 0.95; 95% confidence interval, 0.58-1.55, $P = .8$). Those with incomplete surveillance had longer intervals from EVAR to late rupture (5.24 vs 3.48 years, $P < .001$), complications (4.10 vs 1.78 years, $P < .001$), and all-cause mortality (5.20 vs 2.85 years, $P < .001$). Incomplete surveillance was associated with a lower total cost ($9353 ± $9774 vs $9948 ± $12,628, $P < .001$) and lower cost per year ($1471 ± $1436 vs $3043 ± $3222, $P < .001$).

Conclusions: Nonadherence to SVS guidelines for post-EVAR imaging was not associated with poor outcomes. Our findings suggest the need for improved criteria for defining optimal surveillance intervals to achieve desired outcomes while reducing unnecessary cost and resource utilization.

Author Disclosures: L. C. Baker: Nothing to disclose; **T. Garg**: Nothing to disclose; **M. W. Mell**: Nothing to disclose.

VESS12.

Assessment of Renal Arterial Anatomy and Implications For Endovascular Repair With Fenestrated, Branched, or Parallel Stent-Graft Techniques

Bernardo C. Mendes, Gustavo S. Oderich, Thanila A. Macedo, Randall De Martino, Audra A. Duncan, Peter Gloviczki, Manju Kalra, Mark Fleming, Thomas C. Bower. Mayo Clinic, Rochester, Minn

Objectives: To evaluate renal artery (RA) and accessory RA (ARA) anatomy and implications for endovascular repair with fenestrated, branched, or parallel (chimney, snorkel, and periscope) stent graft techniques.