and 72.3% at 6, 12, and 36 months. True lumen volume increased progressively in both group A (114 mL to 174 mL), and group B (124 mL to 190 mL) from baseline to 36 months. False lumen volume decreased in group A (150 mL to 88 mL) and group B (351 mL to 250 mL), respectively; while total thrombus load in the false lumen increased from 73% to 80% for group A and 84% to 87% in group B in 3 years. Eight patients (4 in each group) showed an increase in total aortic volume of >10%. Twelve patients showed a static volume and 12 patients showed a shrinkage. Aortic volume change had no relationship to pathology, stent graft sizing, and thrombus load, but was positively associated with the placement of a longer graft. There was a small but progressive distal migration of stent grafts in all patients (3.1, 4.5, and 4.6 mm at 6, 12, and 36 months), more prominent in shorter stent grafts (<160 mm). No mortality, rupture, or secondary interventions occurred during follow-up.

Conclusions: Aortic remodeling after TEVAR in chronic dissection is a continuous process. There were no significant differences between chronic dissections and aneurysms in all volumetric parameters. Treating chronic dissections early before aneurysm formation did not seem to have a morphologic advantage.

Readmissions after Abdominal Aortic Aneurysm Repair: Differences between Open Repair and Endovascular Aneurysm Repair

Kevin M. Casey, MD, Tina Hernandez-Boussard, Weesam K. Al-Khatib, MD, Matthew W. Mell, MD, and Jason T. Lee, MD, Stanford University Hospital, Stanford, Calif.

Objective: Reintervention rates are higher for endovascular aneurysm repair (EVAR) compared with open repair (OR) due to endoleak treatments, while surgical reoperations for bowel obstruction and abdominal hernias are higher after OR. However, readmission rates for nonoperative conditions after aneurysm repair are not well documented. We sought to determine reasons for statewide nonoperative readmissions within the first year after open abdominal aortic aneurysm (AAA) repair and EVAR.

Methods: Patients who underwent an elective AAA repair in California over a 4-year period were identified from the Office of Statewide Health Planning and Development (OSHPD) administrative database. All patients who had a readmission within 1 year were included for evaluation. Readmission rates as well as diagnoses associated with each readmission were analyzed and recorded.

Results: From 2005 to 2008, there were 22,972 operations for elective aneurysm repair, 13,454 EVAR (59%), and 9,518 OR (41%). Postoperatively, there was a 30% readmission rate following OR and a 28% readmission rate after EVAR ($P = .02$). The most common principle diagnoses associated with readmission after either type of AAA repair were infection (14.5%), cardiac problems (13.7%), and failure to thrive (12.7%). Patients who underwent OR were more likely to be readmitted with diagnoses associated with failure to thrive ($P < .0001$), gastrointestinal complications ($P < .0001$), wound infection ($P = .04$), and small bowel obstruction (SBO; $P < .0001$). Those who underwent EVAR were more likely to be readmitted with diagnoses of cardiac conditions ($P < .0001$), device-related complications ($P < .0001$), cardiovascular accident (CVA) ($P = .011$), and renal complications ($P < .0001$).

Conclusion: Nonoperative readmission rates within 1 year of elective AAA repair are greater after OR compared with EVAR. Reasons for readmission vary significantly between the two cohorts. Systems-based analysis of these causes of readmission can potentially improve patient expectations and care after elective aneurysm repair.

Characterization of Thoracic Aortic Arch Anatomy in the Asian Elderly Population

Jackie P. Ho, MD,[a] Peixuan Chiu,[b] Heow Pueh Lee, PhD,[b] and Sudhakar K. Venkatesh, MD,[b] [a]Department of Surgery, and [b]the Department of Engineering, National University of Singapore, Singapore.

Objective: Endovascular repair of the aortic arch is often unsatisfactory due to poor stent-vessel conformity and inadequate landing zones. This study aims to characterize the structural dimensions of aortic arch so as to facilitate the development of arch-specific endovascular devices.

Methods: Three-dimensional (3D) models were reconstructed in Mimics (an image segmentation software) from computed tomography (CT) aortograms of 120 Asian elderly patients using manual segmentation. Centerlines of each 3D aortic model were calculated using a repulsive forcefield method. After which, measurements of the aorta and supra-aortic branches were obtained and analyzed in Patran (a Finite Element software). A statistical aortic arch-shape model was built using Principal Component Analysis (PCA).

Results: Average diameters of the ascending, descending aorta, origin of the innominate, left common carotid artery, and left subclavian artery were 39.4 ± 6.7 mm, 34.5 ± 7.9 mm, 18.0 ± 3.8 mm, 12.6 ± 2.7 mm, and 14.1 ± 2.5 mm, respectively. Length of the ascending aorta, innominate to left common carotid artery, and left common carotid to the left subclavian artery were 62.6 ± 11.4 mm, 12.0 ± 5.6 mm, and 18.7 ± 5.6 mm along the centerline. Type II and type III arches were more prevalent than type I. Mean angle of curvature was 103.8 ± 25 degrees. PCA of the 3D centerlines derived three main modes of variation which could account for 61% of the overall shape range.

Conclusions: Aortic arch anatomic information from the Asian elderly population can be used as reference for the development of future endovascular devices.

Inferior Vena Cava Resection and Reconstruction for Retroperitoneal Tumor Excision

William Quinones-Baldrich, MD,[a] Ali Alktaifi, MD,[a] Fritz Eilber, MD,[b] and Frederick Eilber, MD,[b] [a]Division of Vascular Surgery, and [b]the Division of Oncology, UCLA, Los Angeles, Calif.

Objective: The purpose of this study was to review the results of resection and reconstruction of the inferior vena cava (IVC) for en bloc malignant tumor excision.

Methods: We conducted a retrospective review of all patients having IVC resection for en bloc malignant tumor excision. IVC resection was categorized as suprarenal, perirenal, infrarenal, or extensive (>1 segment resected). Repairs were divided into primary, patch, or circumferential. Tumor type, perioperative morbidity, mortality, clinical graft patency, and survival (social security death index) were recorded.

Results: Between 1992 and 2010, 48 patients (24 female) had IVC resection for tumor en bloc excision. Sarcomas were most common (33; 69%: 5 [10%] primary IVC). Thirteen patients had primary IVC repair, nine patch repairs (one autogenous), and 26 had circumferential replacement with polytetrafluoroethylene (PTFE) ringed graft (12-16 mm). Extensive IVC reconstructions were performed in 17 cases of which seven involved the entire IVC with renal vein (RV) and hepatic vein reimplantation, six were suprarenal and perirenal (seven RV reimplanted), and four were infrarenal and perirenal (four RV reimplanted). All single segment (9) repairs were infrarenal. Overall morbidity was 6% (one bowel obstruction requiring surgery, one chyle leak resolved with medical therapy, and one renal failure with complete recovery [L RV reimplant, R nephrectomy]). There was no difference in morbidity between primary, patch, circumferential, and extensive reconstruction. There was no mortality. One IVC graft thrombosis was documented on follow-up (after chemotherapy/sepsis). There were two graft stenosis associated with tumor recurrence. Lower extremity edema was universally avoided. Mean long-term survival was 3.34 years (4 months to 11 years) with a significant difference between primary or patch (mean 66.7 months) and circumferential or extensive repair (mean 39.7 months; $P < .005$). There was no survival difference between single segment and extensive IVC repair (36.7 vs 42.8 months; $P > .12$).

Conclusions: IVC resection and reconstruction for en bloc tumor excision is safe even when extensive repairs are necessary. Replacement of the IVC with a prosthetic graft avoids extremity venous complications and likely contributes to quality of survival. Survival is dependent on tumor behavior and degree of IVC involvement where primary and patch repair has a better prognosis than circumferential resection.

Under-Utilization of Transfer for Ruptured Abdominal Aortic Aneurysm (rAAA) in the Western United States

Matthew W. Mell, MD, Rachael A. Callcut, MD, Fritz Bech, MD, Kit Delgado, MD, Kristan Staudenmayer, MD, David A. Spain, MD, and Tina Hernandez-Boussard, PhD, Stanford University, Stanford, Calif.

Objective: The utility of transferring patients with ruptured abdominal aortic aneurysms (rAAAs) remains controversial. Previous studies have examined rAAAs only after transfer has occurred. The goals of this study were to determine the incidence of transfer and identify factors associated with transfer compared with local care for patients presenting to emergency departments (EDs) with an rAAA.

Methods: Data for patients presenting with International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM) codes for rAAA from 2006 to 2008 were extracted from the National Emergency Department Sample (NEDS), developed as part of the Healthcare Cost and Utilization Project (HCUP). The NEDS is the largest stratified weighted sample of US hospital-based ED visits with links to inpatient files. We compared those transferred to those admitted and treated. Sample weights were applied to produce nationally representative estimates. Patient and hospital factors associated with transfer were identified using multivariate logistic regression. These factors were then analyzed for a relationship with ED death.

Results: A total of 18,363 patients were evaluated for rAAA. Of these, 7% (1201) died in the ED, 8% (1511) were admitted and died without a procedure, 40% (7379) were admitted and died after repair, and 41% (7479) were admitted, treated, and survived. Transfers accounted for only 4% (793) of all ED visits for rAAA. Transfer was more likely for patients seen in nonmetropolitan hospitals (25.6%) vs metropolitan nonteaching (5.4%) or metropolitan teaching hospitals (0.4%; $P < .0.0001$), low volume EDs (24.7% vs 3.8%; $P = .0001$), and non-trauma centers (7.5% vs 0.2%; P <