

## **#1 - EVERSION CAROTID ENDARTERECTOMY: A VERSATILE AND DURABLE PROCEDURE. AN ANALYSIS OF 7781 PROCEDURES**

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**Purpose:** Eversion carotid endarterectomy (CEA) is an effective form of management for atherosclerotic carotid bifurcation disease. Despite the early origins of this technique, it is still used infrequently as an alternative to the standard longitudinal patch closure. In this study we outline our results with the use of eversion endarterectomy for carotid disease over the past 14 years in over 7700 cases.

**Methods:** From August 1993 to November 2006, all patients undergoing CEA were reviewed retrospectively in our vascular registry. Patients undergoing combined CEA with coronary procedures were included. The preferred anesthetic technique for CEA was regional with shunt on demand except in combined procedures where general anesthesia was used without shunt. Mortality and morbidity were reviewed and demographics analyzed. Restenosis was defined at >70%.

**Results:** 6638 patients underwent 7781 CEAs in the study period using the eversion technique. There were 667 procedures performed with combined coronary procedures. The majority (91%) were done in awake patients with a regional anesthesia. Shunts were used on demand in 1.2% of patients undergoing awake CEA. The operative mortality was 51/7114 (0.7%) in the solely eversion group and 21/667 (3.2%) in those patients undergoing combined procedures. There were 76 permanent and 65 temporary neurologic deficits in the eversion group. In long term follow-up there were 102 recurrent stenoses in the eversion group. There was no difference in stroke or mortality based on gender or on the presence/absence of diabetes.

**Conclusion:** Eversion endarterectomy can be performed safely with low stroke mortality rates. It can be used in high risk patients with acceptable results and has minimal restenosis in long term follow-up.

## **#2 - INCREASED AORTIC ARCH CALCIFICATION IN PATIENTS OVER 75 YEARS: IMPLICATIONS FOR CAROTID ANGIOPLASTY AND STENTING IN ELDERLY PATIENTS**

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**Objective:** Recent studies reveal consistently higher periprocedural risk of stroke during carotid angioplasty and stenting (CAS) in octogenarians yet the mechanisms for this increased risk are poorly understood. We analyzed aortic arch calcium content to determine whether it is influenced by age, arch type or patient comorbid conditions.

**Methods:** Aortic arch calcium content and arch classification were examined in consecutive patients undergoing CT scans with aortic dissection protocol. Aortic arch calcium content was determined using a coronary calcium score (Vitrea 2.0); arch classification was determined by multiplanar reconstruction. ANOVA and multivariable logistic regression were used to determine statistical significance.

**Results:** Aortic arch calcium content increased by decade (n=94), age <50:  $12.6 \pm 12.3$ ; age 50-59:  $14.6 \pm 8.2$ ; age 60-69:  $276 \pm 120$ ; age 70-79:  $1,382 \pm 366$ ; age over 80:  $3,889 \pm 778$  ( $p < 0.001$ ). There was significantly more arch calcium in patients over 75 years compared to younger patients ( $2,458 \pm 447$  vs.  $145 \pm 49$ ,  $p < 0.001$ ). Patients with type II aortic arches had higher calcium content compared to type I aortic arches ( $2,028 \pm 546$  vs.  $712 \pm 191$ ,  $p = 0.01$ ). Age, but not diabetes or other risk factors, predicted arch calcium content ( $p = 0.002$ ).

**Conclusions:** Patients over 75 years have significantly more aortic arch calcification compared to younger patients. Increased arch calcium and type II arches may be markers of increased potential for embolization during endovascular manipulation of the aortic arch. Preprocedural determination of arch morphology and calcification may help determine which elderly patients are at increased risk for stroke during CAS.

### **#3 - TRAUMATIC PSEUDOANEURYSMS OF THE HEAD AND NECK: EARLY ENDOVASCULAR INTERVENTION**

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**Background:** Trauma to the head and neck with military munitions often presents with complex multi-system injury patterns. Vascular evaluation typically focuses on the carotid and vertebral arteries, however, trauma to branches of the external carotid artery may also result in devastating complications. Pseudoaneurysms are the most frequent finding on delayed evaluation, and can result in life-threatening episodes of re-bleeding.

**Materials and methods:** Patients evacuated from the Afghanistan and Iraq conflicts with penetrating injury to the face and/or neck were evaluated by the vascular surgery service to determine the potential for occult vascular injury. Patients with significant penetrating injury underwent Computed Tomography Angiogram (CTA) as the initial evaluation, and subsequent arteriography in cases where injuries were suspected or metallic fragments produced artifacts obscuring the vasculature. Data on all vascular evaluations was entered prospectively into a database and retrospectively reviewed.

**Results:** Between February 2003 and March 2007, a total of 13 pseudoaneurysms of the head and neck were found in 11 patients: two in the internal carotid artery, one of the vertebral artery, and ten involving branches of the external carotid. Six pseudoaneurysms were symptomatic, of which two presented with episodes of massive bleeding and airway compromise. Seven pseudoaneurysms were treated with coil embolization, one with gelfoam embolization, two with stent grafts, two with open repair, and one with observation alone. None of the patients undergoing embolization had complications, however a stent graft of the ICA occluded early without stroke. All of the pseudoaneurysms were resolved on follow-up CTA or angiogram.

**Conclusions:** Pseudoaneurysms are a common finding in patients with high-velocity gunshot wounds or blast injuries to the head and neck. Most involve branches of the external carotid and can be treated by embolization. CTA of the head and neck should be performed on all patients with high-velocity gunshot wounds to the face, and in cases of blast trauma with fragmentation wounds of the head and neck.

#### **#4 - ASSOCIATION BETWEEN MINOR AND MAJOR SURGICAL COMPLICATIONS AFTER CAROTID ENDARTERECTOMY: RESULTS OF THE NEW YORK CAROTID ARTERY SURGERY STUDY**

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**Objective:** Most studies on outcomes of carotid endarterectomy (CEA) have focused on the major complications of death and stroke. Less is known about minor surgical complications such as hematoma, cranial nerve (CN) palsy and wound infection. This study used data from a large, population-based study to describe the incidence of minor surgical complications following CEA and examine associations between minor and major complications.

**Methods:** The New York Carotid Artery Surgery study examined all Medicare beneficiaries who underwent CEA from January 1998 to June 1999 in NY State. Detailed clinical information on preoperative characteristics and complications within 30 days of surgery was abstracted from hospital charts. Associations between minor complications (CN palsies, hematoma, and wound infection) and major ones (death/stroke) were examined with chi square tests and multivariate logistic regression.

**Results:** 9308 CEAs were performed by 482 surgeons in 167 hospitals. Overall, 10% of patients had a minor surgical complication (CN palsy 5.5%, hematoma 5.0%, and wound infection 0.2%). In both unadjusted and adjusted analyses, the occurrence of any minor surgical complication, CN palsy alone, or hematoma alone was associated with 3 to 4-fold greater odds of perioperative stroke or combined risk of death and non-fatal stroke ( $p < 0.0001$ ).

**Conclusion:** Minor surgical complications are common after CEA and associated with much higher risk of death and stroke. Future work is needed to better understand the reason for these associations.

## **#5 - EXPECTANT POST-OPERATIVE LUMBAR SPINAL DRAINAGE AFTER THORACIC AORTIC ENDOGRAFTS**

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**BACKGROUND:** Although perioperative lumbar spinal drainage has been practiced for open repair of thoraco-abdominal aortic aneurysms, there is no accepted standard for lumbar spinal drainage for thoracic aortic endografting. We sought to evaluate the risk of spinal cord paraplegia in patients undergoing thoracic aortic endografting with lumbar drainage used expectantly in the post-operative period for those developing neurologic symptoms.

**METHODS:** A prospectively maintained computerized registry was reviewed to identify patients who underwent placement of thoracic aortic endografts. Patient records were analyzed for pre-operative factors (urgency of procedure, aortic pathology), intra-operative details (mean arterial pressure, blood loss, extent of thoracic aortic coverage), and postoperative course (lower extremity neurologic changes, ICU stay, post-operative length of stay, discharge disposition, complications and mortality).

**RESULTS:** Between January 2000 and December 2006, 96 thoracic aortic endografts were placed in 88 patients (69 elective and 27 urgent procedures). Aortic pathology included 64 aneurysms (66.7%), 20 dissections (20.8%), 11 pseudoaneurysms (11.5%) and 1 post graft stenosis (1.0%). Overall, 6 patients (6.3%) died within 30 days of the procedure □ 3 (4.3%) after an elective procedure and 3 (11.1%) after an urgent procedure. No patients demonstrated immediate post-operative spinal cord ischemic symptoms, but 6 patients (6.3%) developed delayed neurologic symptoms between 5 and 54 hours after the procedure. Five of these 6 patients had a lumbar drain placed after the presentation of symptoms and 3 improved their neurologic status □ however, 2 patients (2.1%) remained with severe residual neurologic deficit. All of the 6 patients with spinal ischemia had degenerative aneurysms while none of the 32 patients with non-aneurysm pathology suffered spinal ischemic symptoms ( $p=0.10$ ). Age, extent of coverage, and prior infrarenal aortic graft did not correlate with spinal ischemic symptoms.

**CONCLUSIONS:** Expectant post-operative lumbar spinal drainage can be used after thoracic aortic endografting with acceptably low perioperative spinal cord ischemia rates. The benefit of routine lumbar drainage for thoracic aortic endografting has yet to be determined.

## **#6 - STRATEGIES TO IMPROVE SPINAL CORD ISCHEMIA IN ENDOVASCULAR THORACIC AORTIC REPAIR: OUTCOMES OF A PROSPECTIVE CEREBROSPINAL FLUID DRAINAGE PROTOCOL**

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**Purpose:** Although endovascular repair of thoracic aortic pathology has been shown to reduce the morbidity and mortality rates, spinal cord ischemia remains a persistent problem. We evaluated our experience with spinal cord protective measures using a standardized cerebrospinal fluid (CSF) drainage protocol in patients undergoing endovascular thoracic aortic repair.

**Methods:** From 2004 to 2006, 121 patients underwent elective (n=52, 43%) and emergent (n=69, 57%) endovascular thoracic aortic stentgraft placement for TAA (n=94, 78%), symptomatic ulceration (n=11, 9%), pseudoaneurysms (n=5, 4%) and traumatic aortic transections (n=11, 9%). In 2005, a CSF drainage protocol was established to minimize the risks of spinal cord ischemia in all patients; the CSF pressures were maintained at 10-15 mmHg, and the mean arterial blood pressures was maintained at greater than or equal to 90 mmHg. Data was prospectively collected in our vascular registry for elective and emergent endovascular thoracic aortic repair and the patients were divided into 2 groups (+ CSF drainage protocol, - CSF drainage protocol). Chi square statistical analysis was performed and significance was assumed for P<0.05.

**Results:** Of the 121 patients with thoracic stentgraft placement the mean age was 72 years, 51% were male, and 46% (n=56) underwent preoperative placement of a CSF drain, while 54% (n=65) did not. Both groups had similar comorbidities of CAD (43% vs. 41%), HTN (79% vs. 77%), COPD (32% vs. 34%), and CRI (17% vs. 18%). None of the patients with CSF drainage developed spinal cord ischemia, and 5 (8%) of the patients without CSF drainage developed spinal cord ischemia within 24 hours of endovascular repair (P<0.05). Only 1 of these 5 patients had a prior infrarenal aortic repair. All patients with clinical symptoms of spinal cord ischemia had CSF drain placement and augmentation of systemic blood pressures to greater than or equal to 90 mmHg, and 60% (3 of 5 patients) demonstrated marked clinical improvement.

+ CSF drainage - CSF drainage P-Value  
N 56 (46%) 65 (54%)  
Prior AAA repair 26 (46%) 15 (23%) <0.05  
Left Subcl. Artery Coverage 22 (39%) 12 (18%) <0.05  
Perioperative Vasopressors 36 (64%) 22 (34%) <0.05  
Spinal Cord Ischemia 0 5 (8%) <0.05

**Conclusions:** Perioperative CSF drainage with augmentation of systemic blood pressures may have a beneficial role in reducing the risk of paraplegia in patients undergoing endovascular thoracic aortic stentgraft placement. A future randomized study is warranted.



## **#7 - A 9-YEAR EXPERIENCE WITH ENDOVASCULAR THORACIC AORTIC REPAIR: LONG-TERM FOLLOW-UP AND LESSONS LEARNED.**

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**Objectives:** Endovascular aneurysm repair has become an important part of the surgical armamentarium used to treat thoracic aortic aneurysms, however long-term data remains scant. This study is a single-institution retrospective review of 152 thoracic endovascular aneurysm repairs (TEVAR) completed with first- and second- generation commercially produced thoracic stent-grafts.

**Methods:** Over a 9 year period, 152 endovascular stent-graft repairs of thoracic aortic aneurysms were attempted. The mean age of this cohort was 70 years  $\pm$  17 years. There were 99 men and 53 women who received TEVAR. Successful endograft deployment was achieved in 149 patients (98%). Primary technical success was achieved in 143 patients (94%). The mean length of hospital stay for TEVAR patients was 5.5 days  $\pm$  9.7 days (mode, 1 day).

**Results:** Thirty-six procedures (23.4%) were performed emergently. Peri-operative mortality occurred in 3 of 36 (8.3%) emergent TEVAR patients, and 4 of 116 (3.4%) elective TEVAR patients. Seven procedures (4.6%) were ultimately converted to open repair, this occurred in 2 emergent (5.5%) and 5 elective patients (4.3%). None of the 5 elective patients required conversion in the early post-operative period. Clinical success was achieved in 134 patients (87%). 13 patients (8.6%) developed with type I endoleak and 5 patients (3.9%) demonstrated type III endoleaks in postoperative follow-up. Overall, only 3 pts (2%) suffered a peri-operative stroke and 6 (4%) suffered early or delayed spinal cord ischemia. At 96 months, overall survival was 67% ( $\pm$  5%).

**Conclusion:** Our experience highlights the safe implementation of TEVAR with a low incidence of perioperative morbidity and mortality and acceptable durability. After successful treatment, long-term mortality appears to be mostly related to medical comorbidities. Continued improvements in device delivery and durability will only increase the applicability of this technology.



## **#8 - GROWTH PREDICTORS OF SMALL ABDOMINAL AORTIC ANEURYSMS. POSSIBLE CONSEQUENCES FOR SMALL ANEURYSM TREATMENT STRATEGIES.**

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**Objective:** To provide insight into the impact of cardiovascular risk factors, comorbidities and patient characteristics on growth rates of small abdominal aortic aneurysms (AAA).

**Methods:** Between September 1996 and January 2005, 5057 patients with manifest arterial vascular disease or cardiovascular risk factors were included in the SMART study: Second Manifestation of ARTERial disease. Measurements of the abdominal aortic diameter were performed in all patients. All patients with an initial AAA diameter between 30 and 55 mm were selected for this study. Kaplan-Meier analysis was used for calculation of survival rates. Multivariate regression analysis was performed to test the effect of demographic patient characteristics, AAA diameters and cardiovascular risk factors on AAA growth.

**Results:** Included were 230 patients, 66 years of age on average and 90% was male. Mortality rates for 2 and 5 years were 7.8% and 25.4% (352 and 455 patient years). 4 AAA ruptures occurred in total (in 984 patient years), all fatal and all in AAAs larger than 50 mm in diameter.

In 109 patients, AAA measurements were performed for a period of more than 6 months. The median follow-up time of these patients was 3.3 years (range 0.5 to 11.0 years). Mean AAA diameter was 40.7 mm (standard deviation 6.7) and median expansion rate 2.8 mm/year (mean 3.5; standard deviation 3.3).

Patients that were using lipid-lowering drugs had a 1.4 mm/year lower AAA growth rate compared to non-users of these drugs (95% CI -2,66 to -0,23 mm/year difference, significantly). Other factors were not independently associated with AAA growth.

**Conclusions:** Screening of patients with cardiovascular risk factors for AAA is recommendable. Because the rupture risk of small abdominal aortic aneurysms is small, watchful waiting is preferable to surgical treatment. Lipid-lowering drug treatment appears to be associated with lower AAA growth rates.

## **#9 - SHOULD ENDOVASCULAR REPAIR TREATMENT THRESHOLD BE EXPANDED FOR SMALL ABDOMINAL AORTIC ANEURYSMS?**

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**Objective:** Size recommendations for treatment of infrarenal abdominal aortic aneurysm (AAA) have been established based on risk of surveillance versus open repair. Although reported operative morbidity and mortality for endovascular repair is reduced compared to open repair, the role of endovascular repair for smaller AAA is less defined, and outcomes data in this sub-population is lacking.

**Methods:** All patients undergoing endovascular AAA repair between 2000 and 2006 with various stent graft designs were identified from a prospective vascular surgery registry, and those with maximal diameter 4.0 to 4.9 cm form the small AAA study population. Data was analyzed for indications, co-morbid medical problems, stent graft type, technical factors, peri-operative morbidity and mortality, change in AAA size on follow-up imaging, and long-term aneurysm-related complications and mortality. Life-table methods were used as per reporting standards.

**Results:** Over the 7 year period, there were 743 endovascular AAA repairs, of which 133 (17.9%) were performed for small AAA. Peri-operative complication rate was 9.0% including mostly cardiac related problems. Endovascular stent graft related complications included endoleak 21.1% (Type I=1, Type II=25, Type III=2), and graft limb thrombosis 0.8%. There were no stent graft migrations. AAA size was unchanged or decreased in 81% of patients (mean decrease 7.5mm  $\hat{\pm}$  5.8mm), increased in 15% (mean increase 3.9mm  $\hat{\pm}$  4.7mm) and unable to be determined in 4% (mean imaging follow-up 27 months  $\hat{\pm}$  20 months). Freedom from aneurysm sac expansion was 96% at 1 year, 86% at 3 years, and 77% at 5 years (standard error (SE) = 6.8%). Overall survival was 98%, 93%, and 84% at 1, 3, and 5 years, respectively (SE = 5.6%). Peri-operative 30-day mortality was 0.8% with an aneurysm-related mortality of 1.5% at 5 years (SE = 2.6% at 5 years). There were no deaths from delayed aneurysm rupture.

**Conclusions:** Endovascular repair of small AAA is associated with low peri-operative morbidity and mortality compared to published results for open repair. Considering reduced morbidity and mortality for endovascular repair of small AAA, treatment threshold can be reduced to 4 cm in selected patients.

## **#10 - A META-ANALYSIS OF ENDOVASCULAR REPAIR OF RUPTURED ABDOMINAL AORTIC ANEURYSMS**

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**Objective:** Endovascular repair is being increasingly reported for treatment of ruptured abdominal aortic aneurysms. The aim of this study was to estimate the overall mortality of patients who undergo endovascular repair for treatment of ruptured abdominal aortic aneurysms.

**Methods:** A meta-analysis of the English language literature was performed. 274 publications were reviewed. 31 publications representing 773 patients were included in the meta-analysis. Data were analyzed by weighted least squares regression.

**Results:** The average age was 74. Fifteen percent of patients were female. Preoperative computed tomography scanning was performed in 86.6% of patients. 11.5% of patients underwent endovascular repair using aorto-uniliac grafts. The remainder underwent bifurcated graft placement. The overall technical success rate was 95%. The overall weighted mortality was 27.9 %. Percent of case mix done endovascularly (ratio of endovascular cases to total number of cases) was a strong predictor of mortality (weighted coefficient -0.25,  $p < 0.008$ ).

**Conclusion:** Mortality following endovascular repair of abdominal aortic aneurysms is 27.9 percent. Experience of the center treating the rupture appears to play a significant role in outcome, with a 2.5% reduction in mortality observed for each 10% increase in the percentage of ruptures repaired endovascularly. This relationship does not hold for total abdominal aortic aneurysms repair experience, only for the ratio of endovascular to total cases.

## **#11 - MANAGING ILIAC ARTERY OCCLUSIVE DISEASE DURING ENDOVASCULAR ANEURYSM REPAIR: THE USE OF CONDUITS**

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### **Objective**

Challenging iliac artery anatomy may prevent success of endovascular repairs of thoracic and abdominal aortic aneurysms (EVAR). An endoluminal or extra anatomic iliac artery conduit may expand the use of endovascular stent-grafts. We report a single institutions experience using conduits to manage complex iliac artery anatomy.

### **Methods**

A retrospective review was performed of all patients who underwent EVAR of thoracic (TAA) or abdominal aortic aneurysms (AAA) between 2001 and 2006. Patients requiring an iliac conduit were identified. Patients charts and imaging were reviewed for type of conduit, Iliac artery anatomy, EVAR technical success rate and outcome. Iliac anatomy was evaluated for diameter, calcifications, tortuosity, angulation and pelvic circulation.

### **Results**

Of 857 patients who underwent EVAR, 45 patients (5.3%) required 49 conduits. Thirty (61%) were endoluminal conduits and 19 (39%) were extra- anatomical. Fourteen (28%) were performed for TAA and 35 (72%) for AAA. Ten conduits (20%) were applied for emergency aneurysm repairs. EVAR technical success was achieved in 90% (44/49) of the procedures. Intraoperative complications occurred in 4 patients, all related to ruptures of iliac arteries. Two post-operative deaths occurred, one related to the conduit. Late morbidity related to the conduits occurred in 2 patients, both with endoluminal conduits. One developed stenosis of the conduit and the other developed graft occlusion. Both underwent successful revision.

### **Conclusions**

Iliac artery conduits can safely facilitate endovascular stent graft delivery in EVAR with coexistent complex iliac anatomy. They must be used with caution due to a significant risk of morbidity in this complex patient population.

Nature of 78 access vessels				
Type of Conduit	Severe occlusive disease* (Diameter <7 mm)	Severe calcifications* (>50 % vessel length)	Moderate and severe angulation* (<120 <sup>0</sup> )	Complete vessel occlusions
Endoluminal	33 (42%)	24 (31%)	13 (16%)	3 (4%)
Extra-anatomic	23 (29%)	17 (21%)	21 (27%)	2 (2%)

\* As defined by the Ad Hoc Committee for Standardized Reporting Practices in Vascular Surgery/ American Association for Vascular Surgery, 2002.

## **#12 - DEVICE SPECIFIC ANEURYSM SAC MORPHOLOGY FOLLOWING EVAR: EVALUATION OF CONTEMPORARY GRAFT MATERIALS**

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**Objective:** To analyze device specific aneurysm sac morphology following EVAR with low permeability devices.

**Methods:** Between September 2004 to May 2006 122 patients were treated with EVAR. Three different devices were implanted: 47 Zenith (Cook, Indianapolis, IN), 46 AneuRx (Medtronic, Santa Rosa, CA) with Resiliant Graft Material, and 29 Excluder (Gore, Flagstaff, AZ) with low porosity PTFE. Patients were followed at 1, 3, 6, 12 month intervals with CTA. Standard axial two dimensional computerized tomography measurements were obtained and compared with preoperative imaging. The preoperative scan served as a baseline, and the minor axis diameter, measured at the largest axial cut of the abdominal aortic aneurysm, was compared with the same measurement at follow up.

**Results:** Patient age, sex, and mean maximum aneurysm diameter at baseline were similar among groups. The rate of Type II endoleak were similar for the Zenith (17%), AneuRx (17%), and Excluder (14%). Sac shrinkage at 1month was 3.9%, 8.9%, and 1.2% for the Zeinth, AneuRx, and Excluder ( $p<0.05$ ). At 6 months there was a 2.4%, 11.4%, and a 1.0% sac shrinkage for the Zenith, AneuRx, and Excluder, respectively ( $p<0.05$ ). At 12 months sac shrinkage was 11.9%, 18.4%, and 5.7% for Zenith, AneuRx, and Excluder, respectively ( $p<0.05$ ). At 1 year, sac morphology decreased by 10.4 mm with the AneuRx, 6.73 mm with Zenith and 3.42 mm with the excluder ( $p<0.05$ ). For patients with a Type II endoleak ( $n=19$ ) there was a 8.06% decrease in sac size when compared to a 15.43% decrease in sac size in patients without endoleak ( $n=103$ ) ( $P<0.05$ ). No significant sac expansion was observed among any of the groups.

**Conclusions:** The introduction of new generation graft materials appears to favorably influence sac regression with all devices and are improved compared to published reports of older generation graft materials of the AneuRx and Excluder. However, there is a trend toward greater sac regression with devices utilizing Dacron over PTFE. The relationship of aneurysm morphology and long term effects on aortic stent grafts is yet to be determined.

# #13 - VALIDATION OF A NEW, SIMPLE SUBCLASSIFICATION OF ASA III PATIENTS UNDERGOING PERIPHERAL REVASCULARIZATION BASED ON FUNCTIONAL STATUS

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**Objective:** American Society of Anesthesiology (ASA) classification remains the most widely used risk stratification system in the world. However, it is not practical in patients undergoing revascularization procedures, since the vast majority is classified as ASA III. Modifications have been attempted to better identify subgroups, but none have been adopted. We hypothesized that ASA III patients could be subdivided into two subgroups, ASA IIIa, and ASA IIIb, simply based on their preoperative functional status (> or  $\leq$  than 4 METS), which would allow the largest group of vascular surgery patients to be appropriately subgrouped for their predicted postoperative morbidity and mortality.

**Methods:** All charts of 482 patients (99% male) who underwent revascularization for disabling claudication or critical limb ischemia between 06/2001-10/2006 were reviewed for demographics, comorbidities, operative/interventional details, postoperative complications, and outcomes (MI/stroke, death). SPSS program was used for statistical analysis.

Kaplan-Meier was used for survival, and Cox regression was used for multivariate analysis. Fisher's exact test was used for group comparisons.

**Results:** There were 35 patients in ASA II (7%), 371 patients (77%) in ASA III, and 76 patients in ASA IV (16%). ASA III patients were evenly distributed between ASA IIIa (45%), and ASA IIIb (32%). (Table 1). The age, albumin level, incidence of CAD, DM, cerebrovascular accident, renal insufficiency (Cr>1.5mg/dL), critical limb ischemia (CLI), and length of stay (LOS) were significantly higher in ASA IIIb than IIIa patients (Table 1). There were significantly more MI and death in IIIb patients than IIIa, with similar rates between IIIa vs II and IIIb vs IV (Table 2). The overall survival rates were significantly different in ASA IIIa and IIIb groups, IIIa being close to ASA II and IIIb close to ASA IV (Table 3, Figure). Cox regression analysis showed albumin <3g/dL, CLI, CAD, and renal insufficiency correlated with poor survival.

**Discussion:** Functional status assessment is an integral part of routine preoperative anesthesia evaluation, and we found this to be very reliable in predicting not only postoperative morbidity and mortality, but overall survival in ASA III patients undergoing peripheral revascularization. This simple modification allows ASA III patients (80% of vascular patients) to be unbundled into two very distinct subgroups, which will potentially lead to a more appropriate preoperative risk assessment.

	ASA II	ASA IIIa	ASA III	ASA IIIb	ASA IV
Number(%)	35 (7%)	218 (45%)	371 (77%)	153 (32%)	76 (16%)
Age	59.9 $\pm$ 9.3	65.6 $\pm$ 9.7	68.5 $\pm$ 10.4	72.6 $\pm$ 10.1	72.9 $\pm$ 9.8
Albumin	3.8 $\pm$ 0.4	3.6 $\pm$ 0.5	3.4 $\pm$ 0.6	3.2 $\pm$ 0.6	3.0 $\pm$ 0.7
CAD	20%	52%*	58%	67%*	79%
HTN	49%	75%	74%	74%	82%
DM	17%	43%*	50%	61%*	67%
CVD	9%	14%*	18%	23%*	33%
Hyperlipid.	57%	72%	67%	60%	71%
COPD	11%	20%	22%	25%	32%
Renal insuff	9%	16%*	20%	26%*	49%

Albumin<3 11% 15%\* 19% 38%\* 48%  
 CLI 34% 55%\* 72% 96%\* 92%  
 Open/endo 34/66% 47/53% 45/55% 42/58% 37/63%  
 LOS (days) 4.0 $\hat{\pm}$ 7.7 4.4 $\hat{\pm}$ 5.7 6.0 $\hat{\pm}$ 8.8 8.3 $\hat{\pm}$ 11.6 8.2 $\hat{\pm}$ 10.6

P<0.05 between ASA IIIa and IIIb.

Table 2 ASA II ASA IIIa ASA III ASA IIIb ASA IV  
 MI 0 0.5% 2.2% 4.6% 7%  
 Stroke 0 0 0.3% 0.8% 0  
 Death 0 0.9% 2.7% 5.8% 5.3%

Table 3 Survival  
 12-mo 24-mo 36-mo  
 ASA 2 88 $\hat{\pm}$ 7% 81 $\hat{\pm}$ 9% 81 $\hat{\pm}$ 9%  
 ASA 3A 95 $\hat{\pm}$ 2% 91 $\hat{\pm}$ 2% 85 $\hat{\pm}$ 3%  
 ASA 3 83 $\hat{\pm}$ 2% 77 $\hat{\pm}$ 2% 69 $\hat{\pm}$ 3%  
 ASA 3B 70 $\hat{\pm}$ 4% 57 $\hat{\pm}$ 4% 47 $\hat{\pm}$ 5%  
 ASA 4 60 $\hat{\pm}$ 6% 41 $\hat{\pm}$ 6% 27 $\hat{\pm}$ 6%  
 P value 0.001 0.001 0.001

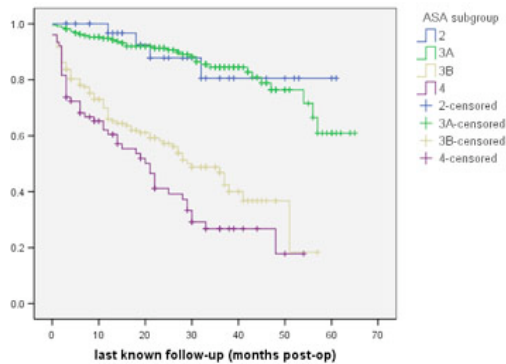


Figure. Overall survival by Kaplan-Meier analysis



## #14 - EPTFE COVERED SPIRAL NITINOL STENTS (ASPIRE) FOR SFA DISEASE

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**Purpose:** To evaluate the safety and efficacy of using the aSpire (vascular Architects, Nashville, TN) ePTFE covered nitinol spiral stent for the treatment of superficial femoral artery (SFA) occlusive disease.

**Methods:** Patients were prospectively entered into a percutaneous balloon/stent angioplasty registry for using the aSpire stent to treat occlusive disease of the SFA. Follow-up consisted of a Duplex ultrasound examinations at 3, 6 and 12 months. The end point was primary patency at 12-months. Overall, 39 different risk factors were evaluate for their association to primary patency. Wilcoxon rank sum was used for continuous variables and Chi-square for categorical variables. Significance level was 0.05.

**Results:** 55 patients underwent SFA balloon/stent angioplasty with the aSpire stent. SFA lesion treated included TASC type A in 15 (27%), type B in 16 (29%), and type C or D lesions in 24 (44%). The mean lesion length was  $89\pm 104$ -mm. Primary stenting was performed in 24 patients, and the other patients had a pre-stent angioplasty. Majority of the patients had a single stent (66%) or two stents (18%). Post-stent angioplasty was performed in 49 (89%) of patients. The mean balloon inflation time (post-stent) was  $113.07\pm 62.43$ -seconds. The primary patency by life-table analysis at 12-months was 85.42%. Female gender ( $P=0.016$ ), history of smoking ( $P=0.009$ ), failure to perform a pre-stent angioplasty ( $P=0.007$ ), longer lesion length ( $P=0.047$ ), number of stents used ( $P=0.012$ ), and lower balloon inflation times ( $P=0.008$ ) were negatively associated with primary patency. The lesion type did not reach statistical significance ( $P=0.09$ ).

**Conclusion:** The aSpire stent is a safe and effective stent for the treatment of SFA occlusive disease. Treating shorter lesion, performing pre-stent angioplasty and using longer balloon inflation times may help improve patency.

## **#15 - THE MEDIAL VERSUS THE POSTERIOR APPROACH IN THE REPAIR OF POPLITEAL ARTERY ANEURYSMS: A MULTICENTER CASE-MATCHED STUDY.**

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**Objectives.** To compare early and mid-term results of medial (MA) and posterior (PA) surgical approach to treat popliteal artery aneurysms (PAAs).

**Methods.** From 1992 to 2006 66 patients (mean age 72 +/- 10 years), underwent surgery for PAAs by either a PA or MA. Patients were case matched according to patient age, co-morbidity, indication for PAA repair, PAA diameter, PTFE or venous bypass.

**Results.** In the 30-days post-operative period, 7 complications occurred in each group, no patients died, and no amputations were necessary. Mean follow-up (including duplex scanning) was 47 months (range, 2-176). The primary and secondary patency rates at 4 years in the PA were 66% and 90% and for the MA 69% and 90 % (NS). Limb salvage rates were not significantly different (97% PA vs 100% MA). In two patients of the MA (6%) PAA growth due to persistent flow in the aneurysm led to late conversion to a posterior approach.

**Conclusion.** In the absence of significant differences in complication rates and mid-term patency rates between the PA and MA, and considering the risk of aneurysm growth after medial approach, the posterior approach seems the surgical method of preference for PAA repair.

## **#16 - INFRA-GENICULATE INTERVENTIONS FOR CRITICAL LIMB ISCHEMIA AS AN ALTERNATIVE TO SURGICAL BYPASS IN HIGH RISK PATIENTS**

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**Objective:** The purpose of this study was to analyze the patency and limb salvage rates after percutaneous intervention for popliteal and crural disease in high-risk patients with critical limb ischemia (CLI).

**Methods:** 110 lesions were treated percutaneously in 63 limbs of 54 patients (mean age 72, range 49-91) between July 2005 and December 2006. Lesion locations were: 6 iliac, 31 SFA, 22 popliteal, 51 tibial/peroneal. 33% of lesions were TASC C and 67% TASC D in the popliteal and infrapopliteal vessels. Indications were rest pain (SVS/ISCVS category 4) in 42% and tissue loss (SVS/ISCVS category 5) in 58%. Co-morbidities included coronary artery disease (44%), diabetes (60%), hypertension (80%), chronic obstructive pulmonary disease (34%), end stage renal disease (ESRD) (30%), congestive heart failure (28%), and tobacco use (18%). 90% of patients had 2 or more co-morbidities, and 52% had inadequate conduit. Treatment included angioplasty (22 popliteal, 51 tibial/peroneal), angioplasty and stent (1 popliteal, 1 tibial), or atherectomy (12 popliteal, 23 tibial/peroneal). 54% of patients received concurrent iliac and/or SFA intervention. Patients were followed with ABI/PVR, or duplex at 1, 3, 6, and 12 months, and the mean length of follow-up was 10 months (range 1-18 months).

**Results:** Percutaneous intervention was technically successful in 95% of limbs. Failure resulted from inability to cross the lesion or to re-enter the true lumen distally. After intervention, the mean ankle-brachial index improved from 0.32 +/- 0.19 to 0.68 +/-0.16 ( $p < 0.05$ ). Primary patency at 6 and 12 months were 88% and 68%. Limb salvage was 82% at 12 months. 18% required a major amputation, and 8% required subsequent bypass. One patient required a more distal bypass as a result of intervention. Incomplete wound healing was noted in 19.6%. Complications were hematoma (8%), immediate thrombosis (3%), embolization (4.5%), perforation (1.5%), contrast nephropathy (1.5%), and pseudoaneurysm (1.5%). Risk factors for limb loss included ESRD, heel ulcer, and severe inframalleolar disease.

**Conclusion:** Percutaneous intervention is safe and feasible as primary therapy for CLI in high risk patients and does not adversely affect the potential for subsequent bypass. Patients with ESRD, heel ulcers, and inframalleolar disease have lower success rates.

## **#17 - PROFUNDA FEMORIS ARTERY ANEURYSMS: ASSOCIATION WITH ANEURYSMAL DISEASE AND LIMB ISCHEMIA**

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**Objectives:** As there is a paucity of data about management and outcome of true profunda femoris artery aneurysms (PFAA), we reviewed our 21-year experience with surgical repair of PFAA. **Methods:** Clinical data of all patients (n=15) who underwent repair between 1985 and 2006 were retrospectively reviewed. **Results:** Fifteen men had 17 PFAAs with a mean diameter of 3.4 cm. Three had acute presentation with rupture (n=2) or acute limb ischemia (n=1), one had local tenderness and 11 were asymptomatic. Sizes of the ruptured PFAAs were 1.5 and 7.5 cm. Eleven (73%) of patients had synchronous aneurysms, most frequently in the popliteal artery (n=7). Three of the asymptomatic patients required an emergent operation because of acute lower extremity ischemia caused by thrombosis of a synchronous popliteal aneurysm (n=2) or for a ruptured iliac aneurysm (n=1). Aneurysmectomy with graft interposition between the common femoral and PFA was used in 15 repairs. Ligation alone was used for 2 aneurysms. Mortality, graft thrombosis and limb loss at 30 days were 0. At a mean follow-up of 28 months (range 3-108), one patient required above knee amputation 2 years after aneurysm ligation and another patient presented with a recurrent aneurysm. Long term graft patency was 100%. **Conclusions:** PFAAs are rare, but often occur with synchronous aneurysms. One-third presented with complications of limb ischemia or rupture caused by PFAA or synchronous aneurysms. Good risk patients with PFAA>2cm should be repaired electively. Aneurysmectomy with femoral interposition graft is a durable repair.

## **#18 - THERAPY OF RENAL ARTERY ANEURYSMS IN NEW YORK STATE: IDENTIFYING PATIENTS UNDERGOING ENDOVASCULAR OR OPEN REPAIR AT RISK OF DEATH OR IN NEED OF FUTURE SUPPORTIVE CARE**

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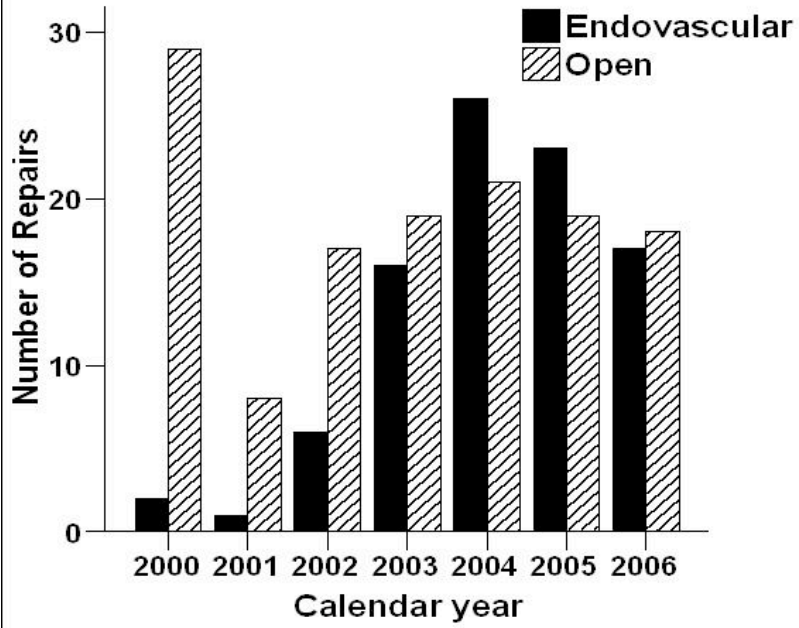
**Objectives:** The purpose of this study was to evaluate determinants of outcomes among patients with a renal artery aneurysm (RAA) undergoing surgical or endovascular repair in New York State (NYS).

**Methods:** A retrospective cohort study of patients who underwent therapy for RAA in NYS from 2000-2006 was identified from the Statewide Planning and Research Cooperative System (SPARCS) database. International Classification of Diseases - 9th revision (ICD-9) coding was used to identify renal artery aneurysm (442.1) repair as surgical (38.46, 39.52, 39.24, 55.51, 38.36, 38.66, 55.61, and 39.55) or endovascular (39.79). Regression models which included hospital and patient characteristics were created to identify predictors of untoward events.

**Results:** There were 91 endovascular and 131 surgical repairs of RAAs between 2000 and 2006 in the State of New York. During this time, there was a significant increase in the proportion of repairs performed endovascularly ( $P < 0.001$ ), with the total number of surgical repairs remaining stable and the number of endovascular repairs increasing. Patients undergoing endovascular repair were more likely to be diabetic (15.4% vs. 6.9%,  $P = 0.041$ ), chronically anemic (5.5% vs. 0.8%,  $P = 0.033$ ) and emergently admitted (48.4% vs. 28.2%,  $P = 0.002$ ). Endovascularly treated patients also had a lower median length of stay (4 vs. 7 days,  $P = 0.008$ ), in-hospital mortality (1.1% vs. 7.6%,  $P = 0.028$ ) and were more likely to return home without the need for nursing services (80.2% vs. 55.7%,  $P = 0.001$ ). In multivariate analysis, predictors of death included concomitant aneurysmal disease (odds ratio (OR) = 40.7,  $P = 0.003$ ), emergent admission status (OR = 30.5,  $P = 0.006$ ), chronic pulmonary disease (OR = 10.1,  $P = 0.016$ ) and coagulopathy (OR = 9.2,  $P = 0.032$ ). Repair of additional aneurysms was not associated with mortality ( $P = 0.40$ ). Predictors of need for further nursing care after discharge included open repair (OR 3.0,  $P = 0.001$ ), concomitant aneurysmal disease (OR = 2.0,  $P = 0.043$ ) and age (OR = 1.03,  $P = 0.014$ ).

**Conclusions:** These data suggest that endovascular management has resulted in an increase in renal artery aneurysms treated. Whether this is a true increase in RAAs requiring management or an extension of indications caused by the availability endovascular repair is unknown. In-hospital mortality of endovascular repair is significantly lower and endovascular patients are more likely to be discharged sooner and to return home without the need for further services despite a higher percentage of emergent admissions. Predictors of further care requirements after discharge include receiving an open repair, concomitant aneurysmal disease and age. Predictors of in-hospital mortality are concomitant aneurysmal disease, chronic pulmonary disease, coagulopathy and emergent admission status.

## Renal Artery Aneurysm Repair by Year



## **#19 - MANAGEMENT OF THORACIC OUTLET SYNDROME IN TEENAGE PATIENTS**

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**Purpose:** While thoracic outlet syndrome (TOS) is known to afflict teen-aged patients, reported data are limited to small groups or individual cases. Management of TOS in teenagers presents many issues, including performing surgery in patients whose skeletal growth may not be completed. Additionally, surgical intervention may result in loss of school time. The aim of this study was to assess our results with a large series of young TOS patients in order to provide insight towards achieving optimal care.

**Methods:** Via a retrospective chart review, we identified all patients < 20 years of age undergoing 1st rib resection for TOS during an 11-year period (8/94 through 9/05) at a single university hospital. History, indication, operative details and pertinent follow up were obtained from the record.

**Results:** There were 18 patients <20 who underwent transaxillary 1st rib resection in the study period. Ages ranged from 13 to 19. Twelve patients had disabling neurogenic (NG) TOS and six presented with Paget-Schroetter Syndrome (PS). Seventy-two percent of patients were female. Most students (14/18) were forced to take a leave from school due to severity of symptoms. Eighty-five percent of female patients presented with NG TOS, whereas PS TOS affected 80% of male patients. All PS TOS patients were involved in high intensity athletics, while 75% of NG TOS patients were student athletes. Follow up ranged from 30 days to over 12 years. There were no significant operative complications in either group. Forty-two percent of NG patients experienced continued symptoms leading to anterior scalenectomy. Overall, 25% of NG TOS patients also required postoperative trigger point injections. All patients eventually recovered and were able to resume academic as well as competitive athletic activities.

**Conclusions:** TOS can be effectively and safely treated in the teenage years. PS responds well to standard thrombolysis and surgical decompression. NG TOS presenting in these young patients appears more likely to require extensive surgical decompression (both rib resection and total scalenectomy) in order to achieve optimal results. Given the psychosocial and academic implications of this disease, careful diagnosis and appropriate treatment is imperative.

## **#20 - SUCCESSFUL SINGLE PUNCTURE INTRAVASCULAR ULTRASOUND DIRECTED INFERIOR VENA CAVA FILTER PLACEMENT**

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**Objective.** When contraindications to anticoagulant therapy exist for thromboembolic disease, interruption of the inferior vena cava (IVC) may prevent fatal pulmonary embolism. The technique of contrast venography has been used to secure placement of an IVC filter at the expense of nephrotoxic contrast and radiation. Intravascular ultrasound (IVUS) has been shown to be a safe and effective method to assist IVC filter placement utilizing double-puncture and bilateral femoral access techniques. These poly-puncture approaches increase the risk for femoral vein thrombosis. This investigation describes our single puncture bedside IVUS only approach to IVC filter deployment.

**Methods.** From December 2005 to January 2007, thirty patients met criteria for the bedside IVUS only approach for IVC filter placement. Eight females and 22 male patients had a mean age 69 years (range 25-82). Indications for filter placement include DVT (n=13), immobility prophylaxis (n=10), intracranial hemorrhage (n=5), and pulmonary embolism (n=2). Prior to procedure, venous duplex ultrasound testing verified a patent iliofemoral venous segment. Once a patent venous system was confirmed, an 8 Fr low profile IVC filter was deployed with IVUS through a single femoral access site. Mean operative time was 19 minutes (range 13-42 minutes). A post-procedure abdominal radiograph confirmed deployment.

**Results.** All patients had patent renal veins and a thrombus free IVC prior to filter deployment as studied by IVUS. The IVC diameter was less than 30mm in all patients allowing an 8 Fr profile system filter to be utilized. Twelve (40%) patients were morbidly obese (BMI > 40). Twenty-nine (97%) filters were successfully deployed in the infrarenal IVC without complication. In one patient, the tip of the filter was suprarenal. This placement was early in our experience. Current follow-up has demonstrated neither renal thrombosis nor kidney failure. One prolonged operative time (42 minutes) was secondary to morbid obesity. Neither access nor systemic complications were associated with filter placement.

**Conclusions.** The use of intravascular ultrasound for bedside IVC filter placement is safe and effective. This technique avoids the need for transport in critically ill patients, and provides imaging for patients too large for conventional fluoroscopy units. Additionally, our technique can further reduce potential double puncture and bilateral femoral vein complications by isolating a single access - single puncture site for filter deployment.



## **#21 - ENDOVASCULAR MANAGEMENT OF CHRONIC INFRA-RENAL AORTIC OCCLUSION**

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### **Introduction:**

We reviewed our experience with the endovascular treatment of chronic infra-renal aortic occlusion between January 2000 and December 2005.

### **Methods:**

We identified 22 patients from our prospectively recorded registry undergoing attempted recanalization of the occluded aorta and iliac arteries. Patient records were retrospectively reviewed for demographics, symptomatology, procedural details and peri-operative mortality and morbidity. Follow-up information regarding vessel patency was recorded.

### **Results:**

Of 22 patients identified, 15 were female (67%). 20 (91%) patients smoked at some point and 14 (64%) were smoking at the time of revascularization. None were diabetic and pre-existing renal insufficiency was noted in 23%. Patients presented with claudication (50%), rest pain (14%), or tissue loss (14%), while one each presented for evaluation of renal artery stenosis, or mesenteric stenosis. Two patients were noted to have distal embolization in the toes and two presented with infected prosthetic grafts. One patient had an occluded axillo-bifemoral graft. Eight patients (36%) had thrombolysis of aortic thrombus performed as part of the recanalization procedure. Technical success was achieved in all but one patient (95%). There were no perioperative deaths with morbidity in five patients including four episodes of acute renal dysfunction, and no need for dialysis and one early thrombosis of the right iliac artery. Post-operative ABI's increased significantly from preoperative ABI's. With a mean follow-up of 11 months, there was no limb loss and primary patency was 100% at 30 days and 1 month. 2 and 3 year patency rates were 83% and 67% respectively.

### **Conclusion:**

Endovascular therapy for chronic, infra-renal aortic occlusion has a high technical success rate, low morbidity and mortality and short-term patency rates that are acceptable.

## **#22 - A COMPARISON OF TWO RETROPERITONEAL SURGICAL APPROACHES FOR DISC ARTHROPLASTY OF THE LUMBAR SPINE**

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### **A Comparison of Two Retroperitoneal Surgical Approaches for Disc Arthroplasty of the Lumbar Spine**

#### **Objectives:**

Anterior spine surgery is becoming a more common procedure in the practice of spine surgeons. Vascular surgeons may be asked to perform spine access surgery for their spine colleagues. There are two common anterior techniques that vascular surgeons may utilize for anterior spine access. We believe there is a significant difference between the midline rectus (MR) and the paramedian lateral rectus (PLR) approaches with regard to implant position for Synthes Prodisc-L arthroplasty. A less than optimal implant position may influence clinical outcome.

#### **Methods:**

Patients for this study were obtained from one of 17 centers participating in the prospective randomized FDA study for the evaluation of the ProDisc-LTM.

We compared results obtained from two different surgical access techniques; Midline Rectus (MR) approach and left Paramedian Lateral Rectus (PLR) approach. Post-operative x-rays were measured from 57 patients of which 46% (26) of these patients were L4/L5 and 54% (31) were L5/S1. Post-operative x-rays were measured by two independent evaluators in order to calculate the displacement from the midline in the coronal and sagittal planes for each of the surgical techniques. Pre and Post-operative clinical outcomes were calculated to quantify which of these surgical access techniques was associated with better outcomes and if there was a clinical correlation with technical accuracy.

#### **Results:**

The PLR approach is associated with a significant malalignment only in the sagittal plane ( $p=0.021$ ). There is no significant difference in clinical outcome for either approach ( $p=0.34$ ). Patients with 5 mm prosthetic displacement from the mid-vertebral point have significantly worse ODI scores than patients with <3mm in both coronal and sagittal planes regardless of the surgical approach employed.

#### **Discussion:**

Vascular surgeons need to be comfortable with spine access approaches in order to provide safe exposure to the spine. This investigation demonstrates that significant clinical and radiographical differences do exist between use of the PLR and MR approaches and that these may indicate a need to change to the MR approach. This study also demonstrates that patients with 5 mm prosthetic deviation from midline in either the coronal or sagittal planes had poorer outcomes, regardless of the approach used.



## **#23 - PROPATEN® GRAFT GENERATES NO SYSTEMIC EFFECT ON MARKERS OF HAEMOSTASIS ACTIVATION OR DETECTABLE HIT-INDUCING ANTIBODIES IN HUMANS.**

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### **Objectives**

Almost a third of patients do not have suitable veins making the use of prosthetic materials necessary in peripheral arterial bypass procedures. Prosthetic materials might cause platelet adhesion and activation of coagulation on the graft. One potential strategy to reduce this thrombogenicity is to covalently bind heparin to the endoluminal surface of grafts.

The human in vivo study described here examines the systemic effects of the recently FDA approved Propaten® heparin coated graft, and addresses whether graft implantation results in:

- 1) A measurable reduction of systemic markers of haemostasis activation as compared to control grafts.
- 2) Antibody formation against heparin, potentially responsible for HIT (= heparin-induced thrombocytopenia), and if so, is the antibody titre of clinical relevance.

### **Methods**

Twenty patients undergoing femoro-popliteal bypass grafting were included in the study. Ten patients received a standard ePTFE Vascular Graft and 10 received a Heparin-bonded ePTFE Graft (Propaten® WL Gore) . Blood samples were drawn pre- and directly postoperatively and at days 1, 3, 5 and week 6 after surgery. Established markers of in vivo activation of platelets and blood coagulation (F1+2, FPA, sGPV, and D-Dimers) were measured using standard commercially available techniques. Furthermore, anti-PF4/heparin antibody titres were measured using a commercially available ELISA.

### **Results**

No statistical differences were observed in any of the markers of in vivo activation of platelets and blood coagulation between patients receiving Propaten® or control ePTFE. Moreover, no antibodies against heparin could be demonstrated up to six weeks after implantation.

### **Conclusions**

No measurable effect of heparin immobilization on systemic markers of haemostasis were found using the Propaten® graft in vivo. Also, no auto-antibodies against heparin could be detected up to 6 weeks after implantation.

## **#24 - THE NATURAL HISTORY OF FIRST TIME HEMODIALYSIS ACCESS: ARTERIOVENOUS FISTULAS VERSUS PROSTHETIC BRIDGE GRAFTS**

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**Objectives:** Patients on hemodialysis depend on durable, easily maintained vascular access and the autologous arteriovenous fistula (AVF) has been the gold standard since its introduction in 1966. The purpose of this study was to compare the natural history of AVF and prosthetic grafts (AVG) in patients who present for first-time access surgery.

**Methods:** We performed a retrospective review of patients undergoing new access creation from January, 2005 through June, 2005. All patients who had prior permanent access procedures were excluded and the study group consisted of first-time access patients only. Categorical data was compared using chi-square analysis, nominal data was compared using Student's t-test, and patency was determined with Kaplan-Meier survival curves.

**Results:** One-hundred and nineteen first-time access procedures were performed, of which 80 were AVF (67%) and 39 were AVG (33%). Demographics and co-morbidities were similar between groups. AVF were primarily created in male patients (69%) and AVG were more commonly placed in female patients (70%). A majority of patients underwent preoperative vein mapping (76% and 82% for AVF and AVG, respectively). The mean vein diameter used in AVF creation was 3.1 mm versus 2.3 mm in the AVG group ( $P < .001$ ). Mean follow-up was 278 days and 272 days for AVF and AVG, respectively. There were 16 (20%) primary failures in the AVF group and no primary failures in the AVG group. AVF received 2.1 interventions/patient-year compared to 2.6 intervention/patient-year in AVG. The mean time to successful cannulation was 146 days for AVF compared to 99 days (median=77) for AVG. There were 3 (7.6%) AVG infections and none in AVF. One- year primary, primary-assisted, and secondary patency was 36%, 55%, 55% and 18%, 45%, 68% for AVF and AVG, respectively ( $P = .6$ ). The cumulative 1-year functional patency was 38% and 54% for AVF and AVG, respectively ( $P=.12$ ).

**Conclusions:** The majority (67%) of first-time access procedures were autologous fistulas per K/DOQI guidelines. AVF demonstrated high rates of primary failure, lengthy maturation times, and similar 1-year patency compared to AVG. Both groups required a similar number of interventions per patient to achieve or maintain function. These results are the first to compare the natural history of arteriovenous fistulas versus prosthetic grafts in contemporary, simultaneous patient populations.