Friday, June 11

1:30 pm - 3:00 pm
C4: Peripheral Vascular Surgical Society Paper Session I
Moderators: Ruth Bush, MD, MPH
W. Darrin Clouse, MD

1:30 pm

Norman M. Rich Military Vascular Surgery Presentation - A Realistic Model of Hemorrhagic Shock in a Porcine Survival Model of IR Injury and Functional Lim Salvage

Capt Heather Hancock MD, Capt Gabriel Burkhardt MD, Lt Cdr Adam Stannard MRCS, Jerry Spencer RVT, LTC Todd Rasmussen MD, Patricia Dixon, Ken Williams

San Antonio Military Medicine Consortium, University of Texas Health Science Center at San Antonio, and the Uniformed Services University of the Health Sciences Bethesda, MD

BACKGROUND: Current pre-hospital damage control strategies have increased survival to surgical care, resulting in an increased burden of severely injured salvaged limbs. There has been renewed emphasis on the functional outcomes of these salvaged limbs. Our group has described the impact of ischemia/reperfusion injury on functional limb salvage in a novel survival porcine model. The objective of this study is to characterize the additive effect of hemorrhagic shock utilizing this model with a reproducible volume controlled hemorrhage method.

METHODS: Groups of 6 animals were randomized to iliac artery repair either immediately, or 1, 3, or 6 hours after arteriotomy and occlusion. Another group underwent iliac artery ligation. Concurrently, 35% of total blood volume was at a controlled rate and re-infused after 30 minutes. Animals recovered from anesthesia and were monitored for 14 days to serially collect markers of functional recovery: circulating biomarkers of injury, electromyography, tissue histology (nerve and muscle) and Tarlov functional scale.

RESULTS: Preliminary results demonstrate: Immediate Iliac repair and 1 hour ischemia animals had full functional recovery by the end of the observation period with minimal histologic evidence of remaining muscle and nerve damage equivalent to controls without hemorrhage. Following 3 hours of ischemia, functional recovery was delayed and impaired, with moderate to severe degeneration of nerves and muscle noted on histology. Animals undergoing 6 hours of ischemia with the addition of hemorrhage had minimal EMG response and suffered severe systemic inflammation. Histological outcomes demonstrated nearly complete muscle and nerve degeneration. Significant mortality differences were noted when comparing delayed reperfusion groups (3, 6, ligation) with those reperfused earlier.

CONCLUSION: These preliminary results suggest a detrimental impact on the ischemic threshold already defined in a non-hemorrhagic model. It is likely that this model more accurately represents the critically ill combat casualty and as such will more reliably inform clinical practice.

AUTHOR DISCLOSURES: Capt Heather Hancock: Nothing to disclose; **Capt Gabriel Burkhardt:** Nothing to disclose; **Lt Cdr Adam Stannard:** Nothing to disclose; **Jerry Spencer:** Nothing to disclose; **LTC Todd Rasmussen**: Nothing to disclose; **Patricia Dixon**: Nothing to disclose; **Ken Williams:** Nothing to disclose

1:45pm

PVSS2. Effect of gender on long-term survival after abdominal aortic aneurysm (AAA) repair: Results from Medicare national database

Natalia N. Egorova[1], Ageliki Vouyouka[1], James F. McKinsey[2], Peter Faries[1], K. Craig Kent[3], Alan Moskowitz[1], Annetine Gelijns[1]

[1]Mount Sinai School of Medicine, New York, NY; [2]Columbia University, New York, NY; [3]University of Wisconsin School of Medicine and Public Health, Madison, WI

Discussant: Mark Schermerhorn, MD, Boston, MA

OBJECTIVES: Historically, women have higher mortality rates after AAA repair than men. Although endovascular repair (EVAR) has improved these rates, how gender affects long-term survival after AAA repair is unknown. We analyzed survival in matched cohorts after EVAR and open (OAR) repair for elective (eAAA) and ruptured (rAAA) abdominal aortic aneurysm.
METHODS: From the Medicare Beneficiary Database, we compiled a cohort of patients who underwent OAR or EVAR repair for either eAAA (n=214,802) or rAAA (n=43,033). Men and women were matched by baseline demographics, comorbidities, institution and operator's experience using propensity method. Long-term survival of the matched groups was compared by Kaplan Meier analysis.
RESULTS: For eAAAs, perioperative mortality was significantly lower among EVAR recipients compared to OAR recipients for both men and women (1.56% vs. 3.86% for men and 2.84% vs. 5.36% for women, $p<0.0001$). One difference, however, is that the EVAR survival benefit was sustained in women but disappeared in men after 1.5 years. Relatedly, the survival benefit of men over women after elective EVAR disappeared after 1.5 years.
For rAAAs, 30-day mortality was significantly lower among male EVAR recipients compared OAR recipients (37.70% vs. 47.62%, $p<0.0001$) but this was not the case for women (46.99% vs. 47.81%, $p>0.05$). Three-year survival was significantly higher for men who received EVAR compared to OAR ($p=0.0053$), but this treatment modality difference was not seen among women. Moreover, survival was substantially higher for men after emergent EVAR ($p=0.0036$).
CONCLUSIONS: Gender disparity is evident from long-term outcomes after AAA repair. This is especially the case for rAAA, where the long-term outcome for women was significantly worse than for men and where the less invasive treatment modality of EVAR did not appear to benefit women as it did for men. These associations require further study to isolate specific risk factors that would be potential targets for improving AAA management.

AUTHOR DISCLOSURES: N. N. Egorova: Nothing to disclose; **P. Faries**: Nothing to disclose; **A. Gelijns**: Nothing to disclose; **K. Kent**: Nothing to disclose; **J. F. McKinsey**: Nothing to disclose; **A. Moskowitz**: Nothing to disclose; **A. Vouyouka**: Nothing to disclose

2:00 pm

PVSS3. Percutaneous verus Femoral Cutdown Access for EVAR in ACS NSQIP

Premal S. Trivedi, Teviah Sachs, Frank B. Pomposelli, Allen D. Hamdan, Mark C. Wyers, Marc L. Schermerhorn
Beth Israel Deaconess Medical Center, Boston, MA.

Discussant: Anil Hingorani, MD, Maimonides Medical Center, Brooklyn, NY

OBJECTIVES: To analyze outcomes of bilateral percutaneous (PC) vs femoral cutdown (FC) access for endovascular repair (EVAR) of AAA.
METHODS: We used NSQIP 2005-07. We selected patients, using ICD-9 & CPT codes, with intact (iAAA) aneurysm, undergoing bifurcated EVAR. Cohorts were defined by presence/absence of CPT for FC. We excluded femoral-femoral bypass & brachial access patients.
RESULTS: We isolated 5086 repairs. PC use increased over time (36 - 46%). Females underwent FC more often (61 vs 39%; $p<.05$). Comorbidities were similar between groups, except for ASA class, which was higher with PC (3.14 vs 3.07; $p<.01$). PC patients received general anesthesia more often (82 vs 78%; $p<.01$). Mean duration of anesthesia (3.5 vs 3.7 hrs) and operative time (2.3 vs 2.5 hrs) were lower with PC (all $p<.01$). 30 d mortality (1.2% PC vs 0.9% FC) aggregate morbidity (9.5% PC vs 8.6% FC) and intra-operative blood transfusions (11% PC vs 10% FC; $p=.23$) were similar between groups. Although uncommon, MI (0.3 vs 0.1%; $p<.05$), pneumonia (1.6 vs 1.0%; $p<.05$) and DVT (1.1 vs 0.3%; $p<.01$) were higher with PC without a significant decrease in infections (1.6 vs 2.4%; $p=.16$) or length of stay (mean: 2.6 vs 3.0d; $p=.47$). Female sex, was independently predictive of worse morbidity (OR: 1.7[1.3, 2.1])& mortality (OR: 1.9[1.0, 3.6]).
CONCLUSIONS: Percutaneous access is being performed increasingly with no benefit in rates of wound infection or 30-day mortality. Contrary to previous reports, PC is associated with higher rates of MI, pneumonia, DVT as well as greater use of general anesthesia, indicating that the potential benefit of decreased sedation is not being exploited. Better selection criteria are needed to maximize the benefits of percutaneous access.

AUTHOR DISCLOSURES: A. D. Hamdan: Endologix,Consulting fees or other remuneration (payment); **F. B. Pomposelli**: Nothing to disclose; **T. Sachs**: Nothing to disclose; **M. L. Schermerhorn**: Medtronic, Research

Grants; WL Gore,Consulting fees or other remuneration (payment); Endologix,Consulting fees or other remuneration (payment); **P. S. Trivedi**: Nothing to disclose; **M. C. Wyers**: Nothing to disclose

2:15 pm

PVSS4. Surgical Revascularization for Aorto-Iliac Occlusive Disease (AIOD): Current Indications and Outcomes

Rabih Chaer[1], Jason Wagner[2], Rogerio Vasconcelos[1], Ulka Sachdev[1], Jae Cho[1], Robert Rhee[1], Michel Makaroun[1]
[1]Surgery, UPMC, Pittsburgh, PA; [2]Eastern Virginia Medical School, Norfolk, VA.

Discussant: Jonathan Eliason, MD, University of Michigan, Ann Arbor, MI

OBJECTIVES: Endovascular interventions have largely replaced surgical treatment of aortoiliac occlusive disease. This review reports on current indications and outcomes of surgical bypass of AIOD
METHODS: Retrospective review of all patients treated for AIOD. Kaplan-Meier and logistic regression analyses of all variables were applied
RESULTS: 2200 patients underwent interventions for AIOD between 2000-08: only 205 (9.3%) had a surgical bypass: 142 aortofemoral and 63 axillofemoral. Mean age was 64.4±10.8 (54% males) (Table 1). Mean FU was 25.3mths. Indications were claudication (25%) or critical limb ischemia (75%, 15% acute ischemia). All but nine patients had bilateral iliac occlusions (61) aortic occlusion to the renals (57) or both (56). Prior endovascular interventions were present in 36%: failed iliac angioplasty/stent in 29% and a failed recanalization in 7%. The mean ABI increased from 0.32±0.20 to 0.85±0.22 post op. Patients with an ax-fem bypass had more comorbidities and a higher mortality (HR=7.9, p<0.001). At 4 years, actuarial survival rate was 77%, primary patency was 80% but secondary patency was 95%. Primary patency was adversely affected by an axillofemoral revascularization (HR=3.5, p=0.01), and ESRD (HR=10.6, p=0.03). Diabetes (HR=12.7, p=0.04) and tissue loss (HR=13.7, p=0.01) were predictors of limb loss
CONCLUSIONS: Surgery for AIOD is currently performed for failed endovascular therapy or advanced aortoiliac occlusion. Despite more challenging anatomy outcomes remain durable and comparable to historical series. Maintenance of proficiency in this surgical reconstruction is essential

AUTHOR DISCLOSURES: R. Chaer: Nothing to disclose; **J. Cho**: Nothing to disclose; **M. Makaroun**: Nothing to disclose; **R. Rhee**: Nothing to disclose; **U. Sachdev**: Nothing to disclose; **R. Vasconcelos**: Nothing to disclose; **J. Wagner**: Nothing to disclose

Patient Characteristics

Patient characteristics	All patients (n=205)	Aortofemoral Bypass (n=142)	Axillofemoral Bypass (n=63)	p-value
DM Renal Insufficiency ESRD Hypertension High cholesterol CAD CHF Prior MI COPD	25.4 (50) 8.4 (17) 2.5 (5) 62.1(126) 58.9(119) 38.2 (78) 4.4 (9) 18.1 (37) 15.2 (31)	26.4 (37) 3.6 (5) 0 (0) 59.3 (83) 53.3 (83) 37.6 (53) 2.1 (3) 13.5 (19) 13.5 (19)	22.8 (13) 19.3 (12) 8.1 (5) 68.2 (43) 58.1 (36) 39.7 (25) 9.5 (6) 28.6 (18) 19.0 (12)	0.60 <0.001 0.002 0.22 0.87 0.78 0.03 0.01 0.31
Smoking status Never Former Current	16.2 (33) 37.2 (76) 46.6 (95	13.4 (19) 33.8 (48) 52.8 (75)	22.6 (14) 45.2 (28) 32.3 (20)	0.02
Statin ASA use	57.1(116) 58.1(118)	60.3 (85) 53.9 (76)	50.0 (31) 67.7 (42)	0.17 0.066

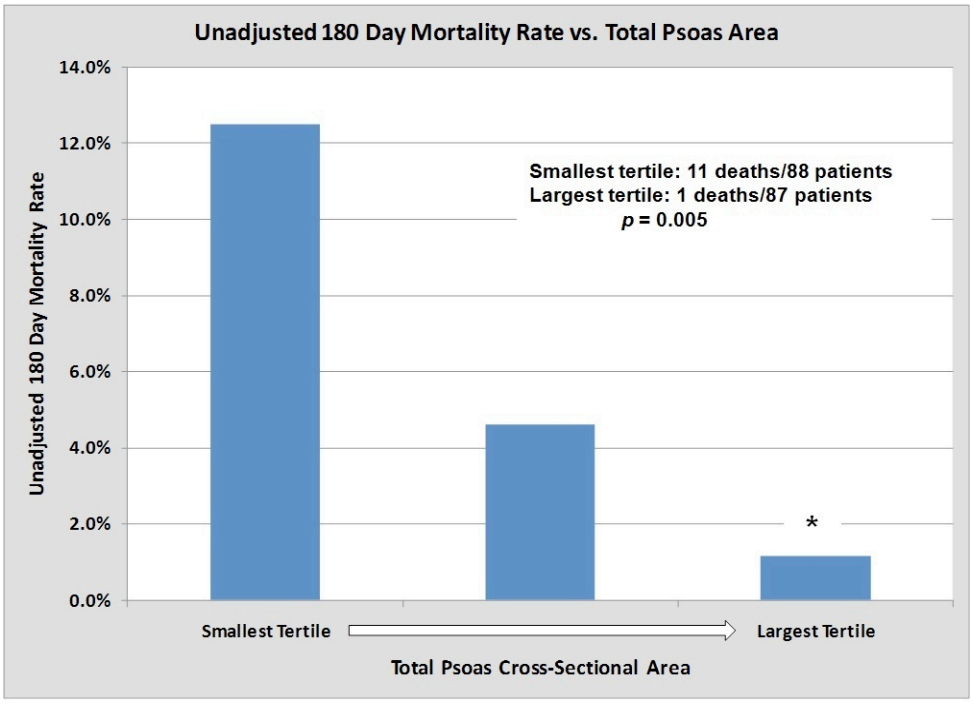
2:30 pm

PVSS5. Frailty, Sarcopenia, and Mortality in Aortic Surgery Patients

Shaun P. Patel, Jay S. Lee, Michael J. Englesbe, Christopher J. Sonnenday, Sven A. Holcombe, Stewart C. Wang, Gilbert Upchurch, John E. Rectenwald, Jonathan L. Eliason
University of Michigan, Ann Arbor, MI.
Discussant: Sean Lyden, MD, Cleveland Clinic, Cleveland, OH

OBJECTIVES: Determining operative risk in patients undergoing aortic surgery is a difficult process, as multiple variables converge to impact overall mortality. Patient frailty is certainly a contributing factor, but is difficult to measure, with surgeons often relying on subjective or intuitive influences. We sought to utilize sarcopenia as an objective measure of frailty, and determine its utility as a predictor of survival following AAA repair.
METHODS: 479 patients underwent elective open AAA repair between 2000 and 2008. 262 patients (54.7%) had preoperative CT scans available for analysis. Cross-sectional areas of the psoas muscles at the level of the L4 vertebra were measured. Postoperative survival and psoas area were analyzed using a univariable model.
RESULTS: Mortality rates ranged from 1.9% (n=5) at 30 days to 6.1% at 180 days (n=16). At 60, 90, and 180 days post-op, the groups of patients who died had significantly smaller mean psoas areas. When stratified into tertiles of psoas area, the group of patients with the smallest psoas area (vs the largest psoas area group) had a higher mortality rate at 60 days (9.1% vs 1.1%, p=0.03), 90 days (10.2% vs 1.1%, p=0.02), and 180 days (12.5% vs 1.1%, p=0.005). Figure 1 demonstrates the stepwise relationship between psoas area and mortality.
CONCLUSIONS: Central sarcopenia, an objective measure of frailty, correlates strongly with mortality following elective AAA repair. A better understanding of the role of frailty and sarcopenia may aid in risk stratification and impact timing of surgical repair, especially in more complex aortic operations.

AUTHOR DISCLOSURES: J. L. Eliason: Nothing to disclose; **M. J. Englesbe**: Nothing to disclose; **S. A. Holcombe**: Nothing to disclose; **J. S. Lee**: Nothing to disclose; **S. P. Patel**: Nothing to disclose; **J. E. Rectenwald**: Nothing to disclose; **C. J. Sonnenday**: Nothing to disclose; **G. Upchurch**: Nothing to disclose; **S. C. Wang**: Nothing to disclose



2:45 pm
PVSS6. Arterial Evaluation by Ultrasound for Dialysis Access

Jonathan Tiefenbrun
Surgery, UCSD, Del Mar, CA.
Discussant: Judith Lin, MD, Henry Ford Hospital, Detroit, MI

OBJECTIVES: The rate of failure of access procedures is high and many of these are unanticipated. A more comprehensive arterial evauation can lead to changes in the planning for dialysis access. A simple schema for arterial study by ultrasound in presented.
METHODS: 74 consecutive ultrasound exams were performed for 38 primary elective(51%)and 36 primary(49%)(with catheters)access cases with ages 28 to 87 including 40 females and 34 males. The Brachial arteries and bifurcations were completely interrogated for pulsatility, atheroma and anomalies. The Radial arteries were interrogated for atheroma, circumfrential stenosis, shadowing, diameter and waveforms. Radial and Ulnar flow was observed for direction, completeness of the digital arch, and doppler Allen tests.
RESULTS: BRACHIAL ARTERY ABNORMALITIES
SEVERE ATHEROMA 10 14%
SMALL ARTERY 3 4% ANOMALIES 5 7%
high bifurcation 4 5%
low bifurcation 1 1%
BIFURCATION ATHEROMA 2 3%
PROXIMAL ULNAR 1 1%
PROXIMAL RADIAL 4 5%
RADIAL ARTERY ABNORMALITIES
ATHEROMA AND SHADOWING 9 12% DISCONTINUITY 1 1%
SMALL ARTERY 5 7%
EXCISED 1 1%
INCOMPLETE DIGITAL ARCH 12 16%
Information to adjust the location of the anastamosis was obtained in 15%. In 27% concern for possible steal was noted. For Brachial artery anomalies (7%)the contralateral arm was used.
CONCLUSIONS: A more comprehensive arterial evaluation prior to Dialysis Access Surgery can uncover arterial problems that could lead to failure of the surgery. Most of these problems can be adressed by a change in location of the access or using the other arm.

AUTHOR DISCLOSURES: J. Tiefenbrun: Nothing to disclose

Friday, June 11

4:00 pm - 5:30 pm
C10: Peripheral Vascular Surgical Society Paper Session II
Moderators: Amy Reed, MD
Todd Rasmussen, MD

4:00 pm
PVSS7. Long Term Outcomes of Internal Carotid Artery Dissection
Atul S. Rao, Michel S. Makaroun, Luke K. Marone, Jae S. Cho, Donald Baril, Rabih Chaer
Vascular Surgery, University of Pittsburgh Medical Center, Pittsburgh, PA.
Discussant: Bernadette Aulivola, MD, Loyola University Hospital, Maywood, IL

OBJECTIVES: The natural history acute carotid artery dissection is poorly characterized. The purpose of this study is to report on our institutional long term outcomes.
METHODS: A retrospective review of patients treated for acute spontaneous or traumatic carotid artery dissection over a 20 year period from August 1989 to July 2009 was performed.
RESULTS: 30 patients with a mean age of 47±19.6 yrs were identified with acute carotid dissection. Six (25 %) were related to trauma, while 24 (75 %) were spontaneous. Common symptoms were contralateral limb weakness

(55%), facial pain (35%), and Horner's syndrome (21%). 8 patients (27%) presented with an acute stroke. Diagnostic modalities used were CTA (52%), MRA (41%), and angiography (48%). 20% had complete carotid occlusion and 25% had near occlusion. Most dissections (61%) had intracranial extension, and 39% were limited to the extracranial cervical portion. The majority (96%) of patients were treated conservatively with anticoagulation (62%) or antiplatelet therapy or both.. One patient underwent stenting. One death from unrelated traumatic injuries was noted. All patients had some degree of clinical symptom resolution, (60% complete) . Two patients had resolution of symptoms, with subsequent recurrence that was successfully managed conservatively. Younger patients (<50) were more likely to present with an acute stroke or have persistent symptoms. Follow up imaging revealed complete/near complete resolution in 47%, and partial resolution in 24%, at a mean follow up time of 735.9±1037.8 days. The mean time to complete or near complete resolution was 11.9 months. Two patients developed an asymptomatic aneurysm that did not require treatment.
CONCLUSIONS: Most cervical carotid dissections can safely be conservatively managed, with the majority achieving some degree of anatomic and symptomatic resolution and low rates of recurrence.

AUTHOR DISCLOSURES: D. Baril: Nothing to disclose; **R. Chaer**: Nothing to disclose; **J. S. Cho**: Nothing to disclose; **M. S. Makaroun**: Nothing to disclose; **L. K. Marone**: Nothing to disclose; **A. S. Rao**: Nothing to disclose

4:15 pm

PVSS8. Improved Hemodynamic Outcomes with Glycopyrrolate over Atropine in Carotid Angioplasty and Stenting

Christine Chung[1], Tejas R. Shah[1], Hyunjoo Shin[1], Neal S. Cayne[2], Thomas Maldonado[2], Mark A. Adelman[2], Patrick J. Lamparello[2], Thomas S. Riles[2], Michael Marin[1], Peter Faries[1]

[1]Mount Sinai Medical Center, New York, NY; [2]New York University Medical Center, New York, NY.
Discussant: Jean Bismuth, MD, The Methodist Hospital, Houston, TX

OBJECTIVES: Prophylactic administration of atropine and glycopyrrolate have been used to prevent bradycardia and hypotension associated with carotid angioplasty and stenting (CAS). This study compared the efficacy of glycopyrrolate to atropine in preventing CAS-induced hemodynamic instability and cardiac complications.
METHODS: 86 patients undergoing CAS between 2005-2009 were evaluated. 51 of these patients received prophylactic atropine or glycopyrrolate administration prior to CAS. Primary endpoints were stroke, MI, postoperative bradycardia (HR <60 beats/min), and hypotension (systolic BP <90). Other outcomes were tachycardia (HR>100), hypertension (systolic BP>160), absolute pressure changes (pre- and postoperative systolic BP difference), arrhythmias, EKG/cardiac enzyme abnormalities, neurologic changes, and access site complications.
RESULTS: Mean age was 72 ± 9 years (p=ns). Baseline systolic BP and HR were equivalent in both groups (p=ns; figure 1). Bradycardia and hypotension were significantly higher in atropine patients compared to glycopyrrolate patients. There was a trend towards reduced hypertension and pressure changes in the glycopyrrolate cohort compared to atropine. Additionally, cardiac events were found to be equivalent.
CONCLUSIONS: Prophylactic glycopyrrolate, compared with atropine, reduces hemodynamic instability during CAS, which may diminish cardiac effects. We recommend glycopyrrolate to prevent CAS-induced bradycardia and hypotension.

AUTHOR DISCLOSURES: M. A. Adelman: Nothing to disclose; **N. S. Cayne**: Nothing to disclose; **C. Chung**: Nothing to disclose; **P. Faries**: Nothing to disclose; **P. J. Lamparello**: Nothing to disclose; **T. Maldonado**: Nothing to disclose; **M. Marin**: Nothing to disclose; **T. S. Riles**: Nothing to disclose; **T. R. Shah**: Nothing to disclose; **H. Shin**: Nothing to disclose

Table 1. Baseline and postoperative comparison between patients with glycopyrrolate and atropine prophylaxis

	Glycopyrrolate	*Atropine*	*P value*
Baseline parameters*			
Systolic blood pressure (mmHg)	137.63 ± 20.4	137.33 ± 17.1	NS
Heart rate (beats/min)	70.22 ± 10.6	64.42 ± 7.8	NS
Postoperative parameters*			
Hemodynamic			
Bradycardia	9/27 (33.3%)	18/24 (75%)	0.005
Hypotension	2/27 (7.4%)	9/24 (37.5%)	0.015
Tachycardia	1/27 (3.7%)	7/24 (29.2%)	NS
Hypertension	2/27 (7.4%)	4/24 (16.7%)	NS
Systolic pressure change (mmHg)	21.41 ± 18.4	26.08 ± 15.8	NS
Morbidity†			
Cardiac	3/27 (11.1%)	5/24 (20.8%)	NS

NS, not significant; *Continuous data presented as mean ± SD; †Cardiac: MI, arrhythmia, ischemic EKG changes, cardiac enzyme elevation

4:30 pm

PVSS9. Geometric and Morphological Analyses of the Superficial Femoral Artery by IVUS

Paul D. Bishop, Daniel G. Clair, Lindsay E. Feiten, Sandra L. Harris, Timur P. Sarac, Vikram S. Kashyap

Cleveland Clinic, Cleveland, OH.

Discussant: Mark Conrad, MD, Boston, MA

OBJECTIVES: The purpose of this study was to characterize geometry and plaque composition of the superficial femoral artery (SFA) using intravascular ultrasound (IVUS).

METHODS: Sequential, cardiac-gated IVUS imaging of a 10cm SFA segment was collected systole using a motorized pullback device (0.5mm/s), Eagle Eye catheter, and IVUS console (Volcano Corp) from patients (n=59) undergoing angiography for evaluation/treatment of peripheral arterial disease (PAD). All imaging was performed prior to any intervention. IVUS data was analyzed using the corresponding post-processing software. Lumen and media-adventitia contours were manually identified which allowed vessel geometry and VH-IVUS plaque composition data to be extracted. Overall mean geometric and plaque composition values were calculated by averaging all cross sectional images over the length of each pullback. Minimum and maximum diameters represent extremes encountered from 11,763 analyzed IVUS images.

RESULTS: See Table 1. Over 70% of all SFA vessel diameters fall between 5mm and 7mm. The mean luminal and vessel cross sectional areas were 15.0 mm^2 and 30.9 mm^2 respectively yielding an overall mean area stenosis of 51.4% for the cohort. Plaque burden in SFA was 106.6 mm^3/cm.

CONCLUSIONS: IVUS imaging provided a wealth of geometric and morphologic data. This quantitative data may better define characteristics of the SFA in patients with PAD.

AUTHOR DISCLOSURES: P. D. Bishop: Nothing to disclose; **D. G. Clair**: Nothing to disclose; **L. E. Feiten**: Nothing to disclose; **S. L. Harris**: Nothing to disclose; **V. S. Kashyap**: Nothing to disclose; **T. P. Sarac**: Nothing to disclose

		Min	Mean±STDEV	Max
Diameter	Lumen(mm)	1.5	4.2±0.9	7.5

	Vessel(mm)	2.2	6.2±0.9	9.6
Plaque				
	Area Stenosis(%)	13.7	51.4±10.7	90.7
	Fibrous(%)		56.3±14.7	
	Fibro-Fatty(%)		10.8±7.8	
	Necrotic Core(%)		18.3±9.7	
	Dense Calcium(%)		14.6±11.5	

Table 1. Summary of SFA geometry and plaque composition

4:45 pm

PVSS10. National Outcomes and Charges for Claudication and Limbthreat: Angioplasty versus Bypass Graft

Teviah Sachs, Frank Pomposelli, Mark Wyers, Allen Hamdan, Marc L. Schermerhorn

Beth Israel Deaconess Medical Center, Boston, MA

Discussant: Peter Nelson, MD, Univ. of Florida College of Medicine, Gainesville, FL

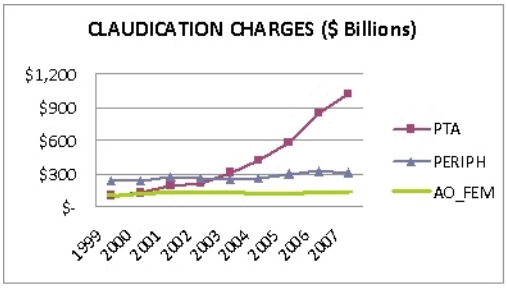
OBJECTIVES: Assess Outcomes & Costs in Patients with Lower Extremity Vascular Disease Undergoing Intervention.

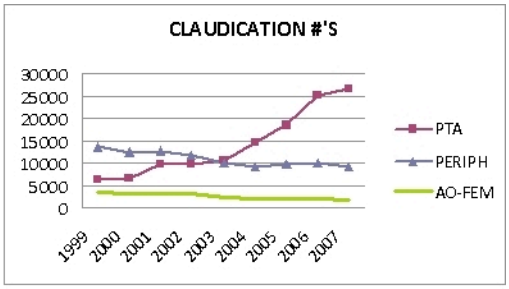
METHODS: We used the NIS database (1998-07), selecting those with atherosclerosis & intervention for claudication (CL) [ICD-9: 440.21] or limbthreat (LT) [440.22-24] with angioplasty +/- stent (PTA) [39.50,39.90], aorto-femoral bypass (AFB)[39.25], & peripheral bypass (BPG)[39.29]. We evaluated demographics, comorbidities, charges & adjusted mortality & major amputation.

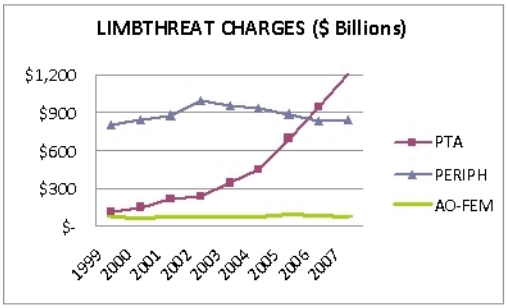
RESULTS: There were 563,142 patients: PTA: 218,656(38%), BPG: 280,022(50%), AFB: 36,307(6%). PTA patients were older than BPG (71 v 70y), more often female (46 v 42%), had similar but lower mortality than BPG for CL (.2 v .4%) and LT (2.1 v 2.5%). PTA had higher major amputation for LT (7% v 4%)[all p<.01]. Median LOS was lowest for PTA (CL:1d, LT:3d), followed by BPG (CL:3d, LT:6d) and AFB (CL:5d, LT:7d)[all p<.01]. Total procedures for CL rose 58% (24,488 - 38,785), while charges rose 228% ($0.46 - $1.5 billion). Procedures for LT rose 5% (34,402 - 36,147) while charges rose 112% ($1.1 to $2.3 billion)[Figure]. For CL and LT, PTA has surpassed BPG & AFB combined.

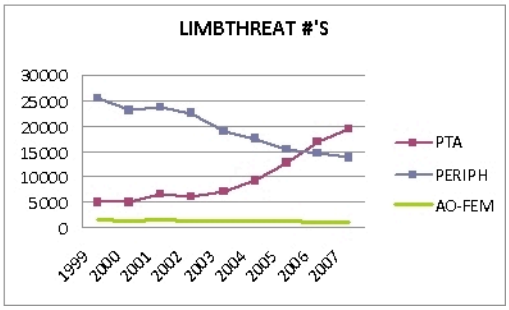
CONCLUSIONS: PTA has altered the treatment paradigm for lower limb ischemia with increased procedures & charges. It is unclear if this represents an increase in patients or number of treatments per patient. Although mortality is lower with PTA, limb loss appears higher, necessitating longitudinal studies to determine the appropriateness of PTA for these patients. The mortality benefit with PTA may be ultimately lost if multiple interventions are performed on the same patients.

AUTHOR DISCLOSURES: A. Hamdan: Nothing to disclose; **F. Pomposelli**: Nothing to disclose; **T. Sachs**: Nothing to disclose; **M. L. Schermerhorn**: Boston Scientific,Consulting fees or other remuneration (payment); **M. Wyers**: Nothing to disclose









5:00 pm

PVSS11. Management of Dialysis-dependent Patients with Critical Limb Ischemia

Jonathan Kittredge[3], Purandath Lall[2], Linda M. Harris[3], Maciej L. Dryjski[3], Hasan H. Dosluoglu[1]

[1]SUNY at Buffalo, VA Western NY Healthcare System, Buffalo, NY; [2]VA Western NY Healthcare System, Buffalo, NY; [3]SUNY at Buffalo, Buffalo, NY.

Discussant: Krishna Jain, MD, Kalamazoo, MI

OBJECTIVES: The goal of our study was to assess the current management strategies in dialysis-dependent patients with critical limb ischemia (CLI), and to identify parameters associated with limb loss in this patient population.

METHODS: Dialysis-dependent patients who presented with CLI (Rutherford 4-6) between 06/2001-06/2009 were retrospectively analyzed.

RESULTS: There were 94 patients (82% males, 119 limbs, mean age 67±10). Co-morbidities included CAD (87%), hypertension (86%), DM (78%), non-ambulatory status (26%). Indications were rest pain (18%), non-healing ulcer (23%), gangrene (53%), and advanced foot sepsis (7%). Primary amputation (PA) was performed in 20%; 26% underwent open bypass, 54% had endovascular (EV) interventions. More EV-treated patients had gangrene than open group (63% vs. 39%, P=0.047). The most distal intervention was infrapopliteal in 47% of patients (open, 51%; endovascular, 62%, P=0.259). Two-year survival was worse in PA group (21±8%, vs. 51±9% in open, 41±7% in EV, P=0.088). Limb salvage (LS) was similar in open and EV groups (2-year LS 60±9.7% vs. 58±8%, P=0.690). Amputation-free survival (AFS) was also similar (2-year AFS 38±9% in open vs. 28±6% in EV, P=0.304). Multivariate analysis showed only non-ambulatory status (OR: 3.0, 95% CI, 1.4-6.8, P=0.007) and gangrene (OR:2.7, 1.1-6.5, P=0.027) being independently associated with limb loss after limb salvage attempt. The LS rate was 0% at 6 months in non-ambulatory patients with gangrene (n=15), whereas it was 70±8% in ambulatory patients with gangrene (n=37). Only 6 of the 15 non-ambulatory patients with gangrene who had LS attempt did not have an amputation; all died within 3 months with non-healed wounds.

CONCLUSIONS: EV interventions play a significant role in the current management of dialysis-dependent patients with CLI, with similar results to open reconstructions. Non-ambulatory dialysis patients with gangrene carry a dismal prognosis and primary amputation should be considered as the initial modality.

AUTHOR DISCLOSURES: H. H. Dosluoglu: Nothing to disclose; **M. L. Dryjski**: Nothing to disclose; **L. M. Harris**: Nothing to disclose; **J. Kittredge**: Nothing to disclose; **P. Lall**: Nothing to disclose

5:15 pm

PVSS12. Socioeconomic and Hospital-Related Predictors of Amputation for Critical Limb Ischemia

Antonia J. Henry[1], Nathanael Hevelone[2], Neal R. Barshes[1], Michael Belkin[1], Louis L. Nguyen[1]

[1]Brigham and Women's Hospital Division of Vascular and Endovascular Surgery, Boston, MA; [2]Brigham and Women's Hospital Center for Surgery and Public Health, Boston, MA.

Discussant: Joseph Ricotta, MD, Mayo Clinic, Rochester, MN

OBJECTIVES: Disparities in limb salvage procedures may be driven by socioeconomic status (SES) and access to high volume hospitals. We sought to identify SES factors associated with major amputation in the setting of critical limb ischemia (CLI).

METHODS: The 2007 Nationwide Inpatient Sample was queried for discharges containing lower extremity revascularization (LER), major amputation, and chronic CLI (N=152,736). The Elixhauser method was used to adjust for comorbidities. Significant predictors in bivariate logistic regression were entered into a multivariate logistic regression for the dependent variable of amputation vs. LER.

RESULTS: Overall, 18.1% of CLI patients underwent amputation. Significant differences were seen between both groups in bivariate and multivariate analysis of SES factors, including race, income, and insurance status (Table 1). Lower income patients were more likely to be treated at low LER volume institutions (OR 1.44, p=0.017). Patients at higher LER volume centers (OR 2.11, p<0.001), admitted electively (OR 1.96, p<0.001) and evaluated with diagnostic imaging (OR 4.30, p<0.001) were more likely to receive LER.

CONCLUSIONS: After controlling for comorbidities, minority patients, those with lower SES, and patients with Medicaid were more likely receive amputation for CLI in low volume hospitals. Addressing SES and hospital factors may reduce amputation rates for CLI.

AUTHOR DISCLOSURES: N. R. Barshes: Nothing to disclose; **M. Belkin**: Nothing to disclose; **A. J. Henry**: Nothing to disclose; **N. Hevelone**: Nothing to disclose; **L. L. Nguyen**: Nothing to disclose

Table 1. Multivariate regression for amputation

	Odds Ratio for Amputation	95% Confidence Interval
Male gender	1.22 (p<0.001)	1.13, 1.32
Black vs. White race	2.33 (p<0.001)	2.02, 2.69
Hispanic vs. White race	1.37 (p<0.001)	1.16, 1.62
Median income		
<\$39,000	1.25 (p=0.005)	1.08, 1.45
\$39,000-47,999	1.11 (p=0.159)	0.96, 1.28
\$48,000-62,999	1.03 (p=0.682)	0.88, 1.21
>\$63,000	ref	
Private payer vs. Medicare	0.83 (p=0.002)	0.74, 0.94
Medicaid vs. Medicare	1.24 (p=0.015)	1.04, 1.48

Saturday, June 12

1:30 pm - 3:00 pm

C14: Peripheral Vascular Surgical Society Paper Session III

Moderators: Leila Mureebe, MD
David Han, MD

1:30pm

PVSS13. Acute Mesenteric Ischemia: A Comparison of Endovascular Revascularization to Traditional Therapy

Zachary M. Arthurs, Jessica M. Titus, Mohsen Bennadazeh, Sunita Srivastava, Matthew J. Eagleton, Daniel G. Clair
Vascular Surgery, Cleveland Clinic Foundation, Cleveland, OH.

Discussant: Sean Roddy, MD, Albany, NY

OBJECTIVES: Few centers have adopted endovascular therapy for the treatment of acute mesenteric ischemia. We sought to evaluate the impact of endovascular therapy on outcomes for the treatment of acute mesenteric ischemia (AMI).
METHODS: A single center, retrospective cohort review was performed on all consecutive patients with thrombotic or embolic AMI presenting between 1999-2008. Patients with mesenteric venous thrombosis, non-occlusive mesenteric ischemia, and ischemia associated with aortic dissection were excluded. Demographic factors, preoperative metabolic status, and etiology were compared. Primary clinical outcomes included endovascular technical success, operative complications, and in-hospital mortality.
RESULTS: Seventy consecutive patients were identified with AMI. Mean age was 64(±16) years; etiology of mesenteric ischemia was 65% thrombotic and 35% embolic occlusions. Endovascular revascularization was the preferred treatment(81%) versus operative therapy(19%). Successful endovascular treatment was achieved in 87%. Endovascular therapy required laparotomy in 69% versus traditional therapy 100% ($p<0.05$) with a median 52cm necrotic bowel resected (Interquartile range(IQR): 11-140cm) versus 160cm (IQR: 90-250cm, $P<0.05$), respectively. Acute renal failure and pulmonary failure occurred less frequently with endovascular therapy (27% vs. 50%, $P<0.05$ and 27% vs. 70%, $P<0.05$). Endovascular treatment resulted in a mortality rate of 39% compared to 53% ($P<0.05$) with traditional therapy. Successful endovascular treatment equated to a mortality of 36%, whereas the mortality for endovascular failures was 50%. Endovascular therapy was associated with improved mortality in thrombotic AMI (Odds Ratio=0.10, 95% Confidence Interval; 0.10-0.76, $P<0.05$).
CONCLUSIONS: Endovascular therapy has altered the management of AMI, and there are measurable advantages to this approach. Utilizing endovascular therapy as the primary modality for AMI reduces complications and improves outcomes.

AUTHOR DISCLOSURES: Z. M. Arthurs: Nothing to disclose; **M. Bennadazeh**: Nothing to disclose; **D. G. Clair**: Nothing to disclose; **M. J. Eagleton**: Nothing to disclose; **S. Srivastava**: Nothing to disclose; **J. M. Titus**: Nothing to disclose

1:45 pm

PVSS14. Initial AV Fistula Flow Rates and Mid-Term Functional Patency

Jason K Kim, MD, Carolyn Glass, MD, Michael J Singh, MD, David L Gillespie, MD, Karl A Illig, MD *Vascular University of Rochester, Rochester, MN*

Discussant: Niten Singh, MD, Madigan Army Medical Center, Tacoma, WA

OBJECTIVES: To identify the relationships between flow rates immediately following arteriovenous fistula (AVF) creation and functional patency.
METHODS: A retrospective review of all patients who had undergone upper extremity AVF creation at a single hospital with intraoperative flow measurement was performed. Flows were measured using an ultrasonic flowmeter (Transonic Systems, Inc., Ithaca, NY) within 5 minutes of clamp release. Functional patency was defined as physical patency plus successful dialysis.
RESULTS: From June 2004 to March 2009, 170 upper extremity fistulas (74 brachiocephalic, 67 basilic

transposition, and 29 radiocephalic) were created in 154 patients (mean age, 59.9 ± 18.1 [mean ± SD]; 83 male, 71 female) with flows recorded. Overall one-year functional patency was 63.5%. Patients that achieved one-year functional patency had a greater initial flow rate (388.5 ± 237.7 mL/min vs 234.3 ± 161.6 mL/min; $p<0.05$). One-year functional patency was seen in 79.7% of patients with an initial flow rate greater than 350 mL/min, but only in 45.3% of patients with initial flow rates less than 250 mL/min. Vein size was not a statistically significant predictor of long-term functional patency for either radiocephalic or brachiocephalic fistulas, but was for basilic transpositions (3.7 ± 1.1 mm vs 3.3 ± 0.9 mm, $p<0.05$).
CONCLUSIONS: In general, immediate flow rates of more than 350 mL/min predict one-year patency, while those less than 250 mL/min predict failure. AVF with rates between these extremes may be candidates for aggressive maturation strategies and/or unusually aggressive follow-up.

AUTHOR DISCLOSURES: Jason K Kim: Nothing to disclose; **Carolyn Glass**: Nothing to disclose**; Michael J Singh**: Nothing to disclose**; David L Gillespie**: Nothing to disclose, **Karl A Illig**: Nothing to disclose

2:00 pm
PVSS15. Development of an Introductory Endovascular Training Curriculum for Medical Student Education: A Multicentre Study
Ritu Aparajita, MRCS, Emily Lilo, MPH, Rajeev Dayal, MD Jason Lee, MD
Columbia University, New York, NY
Discussant: Firas Mussa, MD, New York University Medical Center, New York, NY

INTRODUCTION: Endovascular simulation has been promoted as an educational tool for trainees to learn basic techniques, practice procedures safely, and increase interest in vascular surgery. We sought to determine whether an established medical student curriculum utilizing an endovascular simulator is portable to another academic institution.
METHODS: At site A, medical students participated in an eight-week elective course comprising didactic teachings and weekly mentored simulator sessions. At site B, this curriculum was abbreviated to comprise similar training in vascular anatomy and endovascular principles utilizing the same high-fidelity simulator. Demographics and survey data including interest in vascular surgery were obtained, as well as pre and post-course graded simulator sessions on renal stent or iliac/SFA stent modules. Performance was assessed via a standardized global endovascular rating scale (GERS) by expert observers and objective procedural metrics from the simulator.
RESULTS: 77 medical students (41site A:36site B, 56M:21F) completed the course. GERS parameters including angiography skills, wire handling, and intervention criteria as well as simulator-measured metrics significantly improved from pre- to post-course for both groups of medical students at the two institutions (Table). More than 94% of the students agreed or strongly agreed that the simulation course increased their interest in vascular surgery.
CONCLUSION: A simulation-based endovascular curriculum provides an efficient, valid, and reproducible educational tool to improve technical performance in medical students and interest in vascular surgery. This introductory medical student course is easily transferable to another institution with minimal modification to produce similar results. Early exposure utilizing simulation can stimulate medical student interest and may be an important recruitment tool for new training paradigms in vascular surgery.

Global Endovascular Rating Scale (1-poor performance, 5-expert performance)

	Pre-Course (Mean ± SD)	Post-Course (Mean ± SD)	p-value
Site A			
Angiography	1.80 ± 0.42	4.04 ± 0.55	< 0.01
Wire	1.88 ± 0.51	3.90 ± 0.66	< .01
Intervention	1.77 ± 0.52	3.83 ± 0.55	< .01
Overall	**1.82 ± 0.43**	**3.93 ± 0.53**	**< .01**
Site B			
Angiography	1.51 ± 0.55	3.17 ± 0.63	< .01
Wire	1.68 ± 0.38	2.65 ± 0.68	< .01
Intervention	2.15 ± 0.56	3.56 ± 0.76	< .01
Overall	**1.78 ± 0.36**	**3.13 ± 0.56**	**< .01**
Combined			
Angiography	1.66 ± 0.51	3.63 ± 0.73	< .01
Wire	1.79 ± 0.46	3.32 ± 0.91	< .01
Intervention	1.95 ± 0.57	3.70 ± 0.67	< .01
Overall	**1.80 ± 0.40**	**3.55 ± 0.68**	**< .01**

Simulator objective data

	Renal (Site A)			Iliac (Site B)			SFA (Site B)		
	Pre	Post	p-value	Pre	Post	p-value	Pre	Post	p-value
Total fluoroscopy time (minutes)	11:02 ± 4:21	8:28 ± 4:32	< .01	8:39 ± 7:06	5:39 ± 2:43	< .01	16:37 ± 10:15	10:37 ± 5:33	< .01
Volume of contrast used (ml)	29 ± 17	31 ± 17	< 0.28	35 ± 19	20 ± 12	< .01	47 ± 27	26 ± 17	< .01
Residual stenosis (%)	32 ± 21	17 ± 11	< .01	4 ± 9	4 ± 9	0.45	23 ± 14	25 ± 12	0.3
Correct placement of stent	5.18%	5.71%	0.19	66%	64%	0.45	59%	69%	< .05
ACT level at stent deployment (sec)	188 ± 3	350 ± 87	< .01	325 ± 48	300 ± 63	< .05	293 ± 71	299 ± 68	0.3

Demographics and post-course survey data

	Site A	Site B	Combined
Age (years)	23.6 ± 1.9	24.4 ± 2.0	24 ± 2.0
Gender (M:F)	30:11:00	26:10:00	56:21:00
Video games experience	81%	36%	58%
Strongly interested in Vascular Surgery, n(%)	39/41 (95.1%)	34/36 (94.4%)	73/77 (94.8%)

AUTHOR DISCLOSURES: Ritu Aparajita: Nothing to disclose; **Emily Lilo**: Nothing to disclose; **Rajeev Dayal**: Nothing to disclose; **Jason Lee**: Nothing to disclose

2:15 pm

PVSS16. Bedside IVC Filter Placement Under IVUS Guidance : Improved Accuracy with an Evolved Technique

Kelley D Hodgkiss-Harlow, MD, M R Back, MD, Robert Brumberg, MD, Murray Shames, MD, Paul Armstrong, MD, Brad Johnson, MD, Dennis Bandyk, MD
USF Vascular Surgery, Tampa, FL
Discussant: Patrick Geraghty, MD, Washington University Medical School, St. Louis, MO

PURPOSE: We reviewed our evolving technique of ICU/bedside filter placement under intravascular ultrasound (IVUS) guidance to assess accuracy of filter positioning compared to a concurrent experience of filters placed under fluoroscopic guidance.
METHODS: 192 consecutive IVC filters were placed during the 3-year period 11/2006 through 12/2009. 118 were placed for prophylaxis (61%), with 98 filters (51%) placed under fluoroscopic guidance and venography. Bedside filters (48) placed before mid-2008 utilized a single-puncture, pullback technique with renal veins localized via IVUS and distance measured back to access sites with subsequent 7F sheath reinsertion and filter deployment. After mid-2008, 46 bedside filters were placed by single-puncture technique with IVUS localized IVC landing zones through an 8F delivery sheath without necessary pullback/re-insertion. Venous access was via right femoral (55 fluoro, 83 bedside), left femoral (16, 10), and right jugular (26,1). Optimal, accurate placement was defined as filter positioning between L1-L4 vertebrae with tilt <15 degrees based on post-procedure abdominal XRs.
RESULTS: Filter malpositioning occurred during 6 bedside IVUS procedures; none with fluoroscopic placements. Four malpositions occurred with earlier pullback technique (8.3%) versus two with recent technique (4.4%). Four malpositions occurred with left femoral access (40% incidence), two with right femoral access (2.4% incidence). Left femoral access was associated with greatest incidence of filter tilt for both bedside IVUS cases (10 cases, 30%) and fluoroscopic guidance (3 cases, 6.3%).

CONCLUSION: Our current bedside IVUS-guided technique has improved filter placement accuracy. Left femoral venous access should be avoided to minimize malpositioning and tilt.

AUTHOR DISCLOSURES: Kelley D Hodgkiss-Harlow: Nothing to disclose; **M R Back**: Nothing to disclose; **Robert Brumberg**: Nothing to disclose; **Murray Shames**: Nothing to disclose; **Paul Armstrong**: Nothing to disclose, **Brad Johnson**: Nothing to disclose; **Dennis Bandyk**: Nothing to disclose

2:30 pm

PVSS17. Routine Venography Following Transaxillary First Rib (FRRS) Resection for Subclavian Vein Thrombosis Ensures Excellent Outcomes and Vein Patency

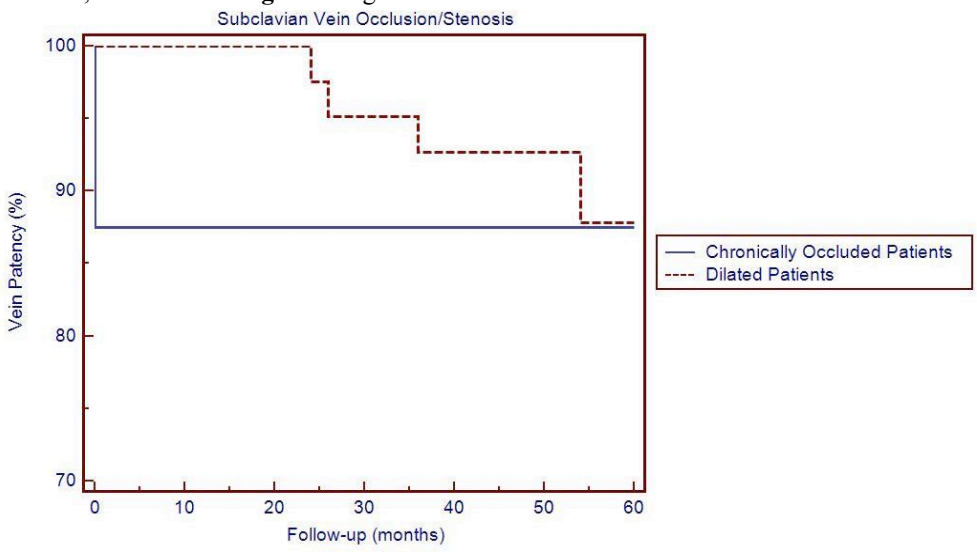
Julie A. Freischlag, Kevin Chang, Jasmine Demos, James Black

Johns Hopkins, Baltimore, MD

Discussant Niren Angle, MD, UC San Diego, San Diego, CA

OBJECTIVES: The purpose of this study is to assess the role of routine postoperative venography in patients who have undergone FRRS for subclavian vein thrombosis by evaluating long term vein patency using imaging by duplex scan.
METHODS: Patients treated with FRRS undergo a venogram 2 weeks postoperatively. The subclavian vein is dilated if there is a >50% stenosis and those patients are then anticoagulated. If no stenosis is seen, anticoagulation is stopped. If the vein is occluded, anticoagulation is continued for 6 months or until the vein recanalizes.
RESULTS: Eighty four patients (42 males and 42 females) underwent FRRS between 12/03 and 11/09. Forty eight patients with stenotic veins underwent dilation; 4 had acute thrombus and were lysed as well as dilated and 3 thrombosed following the venogram and were anticoagulated. All patients remained on anticoagulation on average for 2 (1-5) months. Twenty one patients had patent veins and remained open in the follow-up period. Chronically occluded veins were seen in 16 patients. They remained on anticoagulation for an average of 3 (1-8) months and 14 patients recanalized following FRRS in the first 6 months. Percent patency by Kaplan Meier is seen in the graph. In follow-up, symptomatic restenosis was seen in 3 patients and those veins were redilated. Two patients had late occlusions at 2 years. These 5 patients were all in the dilated group.
CONCLUSIONS: Routine venography directs individual treatment plans for the patient which includes vein dilation, anticoagulation and duplex scanning in the first year. Long term patency was achieved in nearly all patients using this protocol.

AUTHOR DISCLOSURES: J. Black: Nothing to disclose; **K. Chang**: Nothing to disclose; **J. Demos**: Nothing to disclose; **J. A. Freischlag**: Nothing to disclose



2:45 pm

PVSS18. Open surgical and hybrid reconstructions for non-malignant occlusion of the iliofemoral (IF) veins and the inferior vena cava (IVC): factors affecting long term outcome

Nitin Garg[1], Peter Gloviczki[1], Kamran M. Karimi[2], Audra A. Duncan[1], Haraldur Bjarnason[3], Manju Kalra[1], Gustavo S. Oderich[1], Joseph J. Ricotta[1], Stephen Cha[4], Thomas C. Bower[1]

[1]Vascular And Endovascular Surgery, Mayo Clinic, Rochester, MN; [2]Covenant Medical Center, Waterloo, IA; [3]Vascular & Interventional Radiology, Mayo Clinic, Rochester, MN; [4]Biomedical Statistics and Informatics, Mayo Clinic, Rochester, MN.

Discussant: Joseph Naoum, MD, The Methodist Hospital, Houston, TX

OBJECTIVES: To identify factors affecting long term outcome after open surgical reconstructions (OSR) and hybrid reconstructions (HR) for chronic venous occlusions.
METHODS: Retrospective review of 64 OSR and HR for chronic occlusion of IF veins or IVC between January 1985 and September 2009. Primary endpoints were patency and clinical outcome.
RESULTS: 60 patients (26 men, mean age 43 years) underwent 64 procedures. 94% had leg swelling, 90% had venous claudication, 19% had active, and 12% had healed ulcers. (CEAP Classes: C3=30, C4=12, C5=8, C6=12). Fifty-two OSRs included 29 femoro-femoral (Palma; vein: 25, PTFE: 4), 16 femoral-iliac-infrahepatic IVC (vein: 3, PTFE: 13) and 6 complex bypasses. 12 patients had HR (endophlebectomy, patch angioplasty, stents). Early reocclusion occurred after 17% of OSR and 33% HR. Discharge patency was 96% after OSR, 92% after HR. No mortality or pulmonary embolism occurred. 5 year primary and secondary patency was 43% (95% CI 29-56%) and 58% (CI 42-72%), respectively. For Palma vein grafts it was 70% and 78%, for iliofemoral and ilio-infrahepatic IVC bypasses it was 75% and 86%, and for femoro-infrahepatic IVC bypasses it was 44% and 57%, respectively. Complex OSRs and hybrid procedures had 28% and 30% 2 year secondary patency, respectively. Factors adversely affecting graft patency included prosthetic grafts, smoking, male gender and endoscopic vein harvesting. For HR stenting, CFV patch versus iliac stents only significantly increased patency. At last follow up 60% had no venous claudication and no or minimal swelling. All ulcers with patent grafts healed.
CONCLUSIONS: OSR and HR remain viable alternatives to endovascular procedures. Palma vein bypass and ilio-femoral or ilio-caval PTFE bypasses have excellent outcomes with symptomatic relief in over two thirds of the patients. Endoscopic vein harvest, smoking, male gender and long prosthetic grafts adversely affect outcome.

AUTHOR DISCLOSURES: H. Bjarnason: Nothing to disclose; **T. C. Bower**: Nothing to disclose; **S. Cha**: Nothing to disclose; **A. A. Duncan**: Nothing to disclose; **N. Garg**: Nothing to disclose; **P. Gloviczki**: Nothing to disclose; **M. Kalra**: Nothing to disclose; **K. M. Karimi**: Nothing to disclose; **G. S. Oderich**: Nothing to disclose; **J. J. Ricotta**: Nothing to disclose

Saturday, June 12

3:30 pm - 5:00 pm

C19: Peripheral Vascular Surgical Society Paper Session IV

Moderators: Nicholas Gargiulo, MD
Judith Lin, MD

3:30 pm

PVSS19. The Use of Parallel (or "Snorkel") Grafts For Branch Vessel Preservation During Endovascular Repair of Juxta or Pararenal Aortic Aneurysms – A Multi-Center, Retrospective Review

Christopher J Kwolek, MD, William D Jordan, MD, Jason T Lee, MD, Mark F Fillinger, MD, James F Benenati, MD, Shane D O'Keeffe, MD, Ehab E Sorial, MD, Vahid Etezadi, MD, David J Minion, MD
University of Kentucky Med. Ctr., Lexington, KY, United States; Lexington, KY

Discussant: David Neschis, MD, University of Maryland, Baltimore, MD

OBJECTIVES: The Snorkel (or Chimney) procedure utilizes parallel endografts to preserve flow in branch vessels that were covered to increase seal during EVAR. To date, experience has been limited to single-center series, often combining thoracic and abdominal cases and including cases of only partial encroachment of branch vessels. The purpose of this study is to examine multi-center outcomes of Snorkel procedures performed for complete renal or visceral artery coverage during abdominal EVAR.
METHODS: Retrospective data from 6 institutions was compiled on all cases meeting the above criteria.
RESULTS: Twenty-three Snorkels were performed in 18 patients (mean age 77). Preserved branch vessels included 19 renals, 3 SMA and 1 celiac. Indication for Snorkel was type Ia endoleak (9), short neck (8), and restoration of renal flow (1). Average pre-op neck length was 5.4 mm (range 0 to 15).
Aortic endografts included 7 Excluders, 5 Zeniths, 2 Talent, 1 Renu, 1 TAG, 1 AneuRx, and 1 Powerlink. Snorkel endoprostheses included 10 Viabahns, 10 iCASTs, 2 Fluency, and 1 Omnilink.
There were no peri-operative deaths, but one myocardial infarction.
Follow-up ranged from 1 to 23 months. No snorkel occluded. There were three type I endoleaks. Two (pre-op neck lengths of 2 and 5 mm) resolved without intervention. The other (pre-op neck length of 5mm) is early and being followed. Mean sac diameter for the group decreased from 6.4 to 6.1 cm. No aneurysm enlarged. Significant renal deterioration occurred in one patient (treated for restoration of renal flow). Two patients died from unrelated causes at 3 and 6 months.
CONCLUSIONS: The "Snorkel" technique can be effective across a broad range of devices and multiple independent surgeons. However, seal may be compromised in very short necks. Until branched or fenestrated grafts become widely available, this option deserves consideration in "high-risk" or "bail-out" situations.

AUTHOR DISCLOSURES: Christopher J Kwolek: Cook, Medtronic, Endologix, WL Gore, Research grants; **William D Jordan**: Gore, Medtronic, Aptus, Lombard, Endologix; Research grants; Gore, Medtronic, Endologix, Consulting fees or other remuneration (payment); **Jason T Lee**: Nothing to disclose; **Mark F Fillinger**: WL Gore, Cook, Medtronic, Lombard, Endologix, M2S, Consulting fees or other remuneration (paymtnt); **James F Benenati**: Honoraria, Gore Inc.; **Shane D O'Keeffe**: Nothing to disclose;

Ehab E Sorial: Nothing to disclose; **Vahid Etezadi**: Nothing to disclose; **David J Minion**: WL Gore, Consulting fees or other remuneration (payment)

3:45 pm

PVSS20. Thoracic Endovascular Repair for Aortic Syndromes: An Indication and Anatomic Based Analysis

Martyn Knowles, MD, Erin H Murphy, MD, J. Michael Dimaio, MD, J. Gregory Modrall, MD, Carlos H Timaran, MD, Michael E Jessen, MD, Frank R Arko, MD
University of Texas, Dallas, TX
Discussant: Ravi Veeraswamy, MD, Atlanta, GA

INTRODUCTION: Endovascular Repair for complex thoracic aortic pathology has emerged over the past decade as an alternative to open surgical repair. Reports suggest lower morbidity and mortality rates associated with endovascular interventions. The purpose of this report was to analyze a large multicenter single institution experience in endovascular thoracic aortic repair based on clinical presentation as well as within and outside specific instructions for use.
METHODS: Records of all patients undergoing thoracic aortic endografting at our institution were retrospectively reviewed for demographics, interventional indications and acuity, operative details and clinical outcomes. Study outcomes were analyzed by clinical presentation (Urgent/Emergent versus Elective) and aneurysm morphology that was within and outside specific instructions for use as recommended by the manufacturer.
RESULTS: Between March 2006 and October 2009, 96 patients underwent thoracic endografting for aneurysm(n=43), transection(n=7), penetrating ulcer(n=11), dissection(n=19; acute=9, chronic=10), pseudoaneurysm(n=11), or miscellaneous indications(n=5). Endografting was performed with various endografts(Gore-Tag:59; Medtrontic-Talent:26;Zenith-TX2:7;Combination:4). Involvement of the arch(n=42) was treated with subclavian artery coverage without revascularization in 20(20.38%), debranching in 13(13.54%), and

fenestration/stenting in 9(9.38%). Involvement of the visceral vessels(n=31,32.29%) was treated with debranching in 17(17.71%) or fenestration/stenting in 13(13.54%). Patients had a mean follow-up of 11.5+/-10.96(range:0-38) months. Overall mortality was 6.25%(n=6). Mean ICU stay was 6.26+/8.55(range: 1-63,median:4) days and hospital stay 9.97+/-10.31(range:1-65,median:65) days. Major complications were infrequent and included: spinal cord ischemia(n=6,6.25%), stroke(n=6,6.25%), myocardial infarction(n=3,3.15%), renal failure(n=6,6.25%), and wound complications (n=9,9.38%). Reoperation was required in 13(13.54%), with early intervention in 4(4.16%). The vast majority of patients were discharged directly to home (n=66, 68.8%). There were no significant differences between death [1/49(2%) versus 5/47(10.6%), p=0.093], stroke [3/49(6%) versus 3/47(6%), p=0.32] , or spinal cord ischemia [3/49(6%) versus 3/47(6%), p=0.32] when comparing urgent/emergent presentation to elective cases, respectively. However, there were significant differences in death [6/57(10.5%) versus 0/39(0%), p=0.039] and spinal cord ischemia [6/57(10.5%) versus 0/39(0%), p=0.39] but not stroke [5/57(8.8%) versus 1/39(2.5%), p=0.215) when procedures were performed outside the specific instructions for use.
CONCLUSIONS: Results of this single-institution report suggest that endovascular thoracic aortic repair is a safe and effective treatment option for a variety of thoracic pathology including both elective and emergent cases. However, off label usage of the devices is associated with a significantly higher risk of mortality and spinal cord ischemia but the risk still appears acceptable given the majority of cases were emergent.

AUTHOR DISCLOSURES: Martyn Knowles: Nothing to disclose; **Erin H Murphy**: Nothing to disclose; **J. Michael Dimaio**: Nothing to disclose; **J. Gregory Modrall**: Nothing to disclose; **Carlos H Timaran**: Nothing to disclose; **Michael E Jessen:** Quest Medical, Inc., Scientific Advisory Committee; **Frank R Arko**: Volcano, Medtronic, Bard, Terumo, Abbott, Research grants; Gore, Medtronic, Honoraria; Angioscore, Medtronic, Speakers bureau; EKOS, Terumo, Scientific Advisory Committee; Covidien, Bard, Medtronic, Consulting fees or other remuneration (payment); Roche, Biomarin, Brocadia, Medtronic, Stock Options or Bond Holdings

4:00 pm

PVSS21. Endovascular Solutions to Arterial Complications Resulting from Posterior Spine Surgery

Shang Loh, Thomas Maldonado, Todd Berland, Caron Rockman, Frank J. Veith, Neal S. Cayne

Surgery, NYU Medical Center, New York, NY.

Discussant: Brian Nolan, MD, Dartmouth Hitchcock Med. Ctr., Lebanon, NH

OBJECTIVES: Iatrogenic arterial injury is an uncommon but recognized complication of posterior spine surgery. The spectrum of injuries includes vessel perforation leading to hemorrhage, delayed pseudoaneurysm formation, and screw impingement upon arterial vessels. Traditionally repair of these injuries involved open direct vessel repair or graft placement leading to significant morbidity.
METHODS: We describe five cases of iatrogenic arterial injury (four aortic and one iliac) identified during or after posterior spinal surgery between July 2004 and August 2009 at our hospital.
RESULTS: In two cases, intra-operative arterial bleeding was encountered. The posterior wounds were packed, closed, and the patient placed in a supine position. In both cases, angiography demonstrated arterial injury necessitating repair (Table 1). Femoral cut-downs were performed and covered stent grafts (Medtronic AneuRx and Atrium covered stent) were deployed to exclude the areas of injury. In three additional cases, post-operative computed tomography imaging demonstrated a pedicle screw abutting/penetrating the thoracic or abdominal aorta. In all three cases a combination of angiography and/or IVUS was performed confirming indention/perforation of the aorta by the screw. Femoral cut-downs were performed and aortic stent grafts were deployed to cover the area of aortic contact prior to hardware removal (Medtronic AneuRx and Cook Zenith). All five patients did well with no postoperative bleeding and were discharged home in good condition.
CONCLUSIONS: Endovascular repair of arterial injuries offers a safe and less invasive alternative in patients with these types of injuries.

AUTHOR DISCLOSURES: T. Berland: Nothing to disclose; **N. S. Cayne**: Nothing to disclose; **S. Loh**: Nothing to disclose; **T. Maldonado**: Nothing to disclose; **C. Rockman**: Nothing to disclose; **F. J. Veith**: Nothing to disclose

4:15 pm

PVSS22. Aortobronchial Fistulas: Thoracic Endovascular Repair Is a Safe and Definitive Management Strategy

Charles J Bailey, MD, Seth Force, MD, Karthikeshwar Kasirajan, MD, Elliot L Chaikof, MD, PhD, Ravi K Veeraswamy, MD
Emory University Hospital- Dept. of Surgery, Emory University School of Medicine; Atlanta, GA

Discussant: Michael Singh, MD, University of Rochester Medical Center, Rochester, NY

OBJECTIVES: To assess the safety and efficacy of thoracic endovascular aortic repair (TEVAR) in the management of aortobronchial fistulas.
METHODS: A retrospective review was performed at Emory University Hospital to identify all patients who presented with an aortobronchial fistula. The diagnosis was based on clinical, radiological and bronchoscopic findings. Patients were identified who underwent TEVAR as definitive management of these fistulas. Demographics, history of prior thoracic aorta pathology or intervention, type and number of endografts used, need for re-operation, as well as clinical and radiologic follow-up data were collected for each individual.
RESULTS: Between 2003 and 2009, eleven patients received TEVAR as definitive management of aortobronchial fistulas. Technical success was achieved in 10 of 11 patients (91%). Six of the patients (55%) had previously undergone thoracic aortic surgery. One patient developed a proximal Type 1 endoleak after graft deployment, requiring re-intervention for additional graft placement. No intraoperative or 30-day mortalities occurred. Postoperative clinical and radiographic assessment ranged from 1 to 38-months, with a mean of 9.7 months. For all 10 patients in which technical success was achieved at initial operation, no endoleaks were noted at follow-up CT scan. No further intervention was required on any of these patients.
CONCLUSIONS: This study represents the largest reported series on the use of TEVAR for definitive management of aortobronchial fistulas. Supported by postoperative surveillance imaging and clinical evaluation, TEVAR has proven to be a safe and effective method for definitive management of an otherwise lethal condition.

AUTHOR DISCLOSURES: Charles J Bailey: Nothing to disclose; **Seth Force:** Nothing to disclose; **Karthikeshwar Kasirajan**: Research grants,WL Gore & Medtronic; **Elliot L Chaikof**: Nothing to disclose; **Ravi K Veeraswamy**: Nothing to disclose

4:30 pm

PVSS23. Percutaneous Evar In Females Leads To Fewer Wound Complications

Weesam K Al-Khatib, MD, Jason T Lee, MD, Monica M Dua, MD, Mohamed A Zayed, MD, E. John Harris, MD, Ronald L Dalman, MD
Stanford University Medical Center, Stanford, CA

Discussant: Thomas Maldonado, MD, New York University, New York, NY

OBJECTIVES: Successful endovascular aneurysm repair (EVAR) in women is often technically limited by smaller access vessel anatomy. Percutaneous femoral artery closure utilizing the "Preclose" technique (pEVAR) is a minimally invasive alternative to open surgical exposure and has been demonstrated to be technically feasible in mostly male cohorts. The purpose of this study is to evaluate the efficacy and access-related outcomes of pEVAR in women.
METHODS: We reviewed females undergoing EVAR from 2000-2009. We adopted an all percutaneous approach in 2007 if technically feasible based on pre-operative CT-A criteria including femoral diameter >7mm, <25% depth posterior plaque calcification, and lack of circumferential atheroma. All percutaneous closures were performed using two Perclose Proglide devices for sheath sizes from 12F to 26-French.
RESULTS: Out of 736 EVARs performed, 120 (16.3%) were in women, requiring large sheath access to 178 femoral arteries. Since 2007, 30 females were evaluated for possible percutaneous access, with 24 of 47 eligible femoral arteries (52%) accessed percutaneously (PERC). The remainder were treated via surgical exposure (OPEN). Technical success rate of PERC was 96% with one device pulling through a thin anterior arterial wall requiring open femoral conversion. The OPEN group had a higher rate of total wound complications compared to PERC (34.8% vs. 8.3%, $p<0.05$) including hematoma (8.7% vs. 0%), wound breakdown (8.7% vs. 0%), and pseudoaneurysm (4.3% vs. 0%). There were two cases of femoral artery thrombosis in the PERC group requiring repair in the immediate post-operative period; however, this was not significantly different than in the OPEN group (8.7% vs. 8.3%).

CONCLUSIONS: Selective percutaneous closure of femoral arteries for EVAR is safe and effective in the female population with fewer wound complications than open exposure. Approximately one half of females are candidates for pEVAR and complications can be limited by careful selection based on preoperative imaging.

AUTHOR DISCLOSURES: Weesam K Al-Khatib: Nothing to disclose; **Jason T Lee**: Nothing to disclose; **Monica M Dua**: Nothing to disclose; **Mohamed A Zayed**: Nothing to disclose; **E. John Harris**: Nothing to disclose; **Ronald L Dalman**: Research grants, Medtronic AVE, Abbott

4:45 pm

PVSS24. Effects of Anesthesia Versus Regional Nerve Block on Major Leg Amputation Mortality Rates

Lin Roy, Anil Hingorani, MD, Enrico Ascher, MD, Alexander Shiferson, DO, Kapil Gopal, MD, Daniel Jung, DO, Theresa Jacob, PHE
Maimonides Medical Center, Brooklyn, NY

Discussant: Matthew Corriere, MD, Emory University School of Medicine, Atlanta, GA

OBJECTIVE: There are greater than 120,000 above-knee-amputation (AKA) and below-knee-amputation (BKA) each year. Traditionally general anesthesia (GA) was the preferred modality of anesthesia. The use of regional nerve blocks has recently gained popularity, however, without the supporting evidence on any mortality benefits. Our objective is to evaluate whether regional nerve blocks yield significant mortality reduction in major lower extremity amputations.

METHOD: Retrospective data of both AKA and BKA procedure at the Maimonides Medical Center from 2005 to 2009 were analyzed. Patient received either general sedation, spinal or ultrasound-guided regional nerve blocks as per decision of attending anesthesiologist. Regional nerve blocks for major lower extremity amputations consisted of femoral, sciatic, saphenous and popliteal nerve blocks. A retrospective inquiry of 30-day mortality was performed with reference to the Social Security Death Index and hospital records.

RESULTS: 12.9 SD, range of 33 to 98 years) of which 46 patients had regional nerve blocks and 112 had GA or spinal blocks. Patients who received both regional blocks and GA/spinal blocks within 30 days were excluded. The overall 30-day mortality was 17.1% (27 patients) consisted of 15.2% for regional nerve analgesia versus 17.9% for GA/spinal blocks (p=0.867). Age did not affect mortality outcome in either groups of anesthesia modality. Table 1 illustrates the mortality breakdowns mortality for AKA and BKA.±One hundred and fifty-eight patients were included in the study (82 males and 86 females with mean age of 74.5 years

TABLE1: AKA and BKA mortality
AKA mortality
ALIVE DEATH MORTALITY AVG AGE (YRS)
REGIONAL 19 6 24.00% 77.6
GA/SPINAL 46 18 28.10% 77.7
(p=0.7945)
BKA mortality
ALIVE DEATH MORTALITY AVG AGE (YRS)
REGIONAL 21 1 4.50% 69.6
GA/SPINAL 42 5 10.60% 72.7
(p=0.6563)

CONCLUSIONS: Our analysis did not reveal any mortality benefit of utilizing regional nerve block over general anesthesia or spinal blocks

AUTHOR DISCLOSURES: **Lin Roy**: Nothing to disclose, **Anil Hingorani**: Nothing to disclose; **Enrico Ascher**: Nothing to disclose; **Alexander Shiferson**: Nothing to disclose; **Kapil Gopal**: Nothing to disclose; **Daniel Jung**: Nothing to disclose; **Theresa Jacob**: Nothing to disclose