



Western Vascular Society

30th Annual Meeting | September 19-22, 2015

Grand Wailea
Wailea, Maui, Hawaii

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www.vascularweb.org/wvs



OFFICERS & COMMITTEES

OFFICERS

Larry A. Kraiss, MD, *President*
William C. Pevec, MD, *President-Elect*
York N. Hsiang, MB, MHSc, *Secretary-Treasurer*
Benjamin W. Starnes, MD, *Recorder*
William J. Quinones-Baldrich, MD, *Councilor*
Joseph L. Mills, Sr., MD, *Councilor*
Peter A. Schneider, MD, *Councilor*

PROGRAM COMMITTEE

David A. Rigberg, MD, *Chair*
Niten Singh, MD
Mark R. Sarfati, MD
Wei Zhou, MD
Larry W. Kraiss, MD, *President (Ex-Officio)*
William C. Pevec, MD, *President-Elect (Ex-Officio)*
York N. Hsiang, MB, MHSc, *Secretary-Treasurer (Ex-Officio)*
Benjamin W. Starnes, MD, *Recorder (Ex-Officio)*

MEMBERSHIP COMMITTEE

Erica L. Mitchell, MD, *Chair*
Thomas F. Rehring, MD
Spencer Galt, MD
York N. Hsiang, MB, MHSc, *Secretary-Treasurer (Ex-Officio)*

WVS REPRESENTATIVE TO THE SVS

York N. Hsiang, MB, MHSc

LOCAL ARRANGEMENTS COMMITTEE

Raymond Wai Mun Lee, MD
Dwight C. Kellicut, MD

PAST MEETINGS

YEAR	LOCATION	PRESIDENT
1986	Dana Point, CA	Organizing Committee
1987	Tucson, AZ	W. Sterling Edwards, MD
1988	Monterey, CA	Robert B. Rutherford, MD
1989	Kauai, Hawaii	D. Eugene Strandness, Jr., MD
1990	Coronado, CA	Ronald J. Stoney, MD
1991	Rancho Mirage, CA	Victor M. Bernhard, MD
1992	Maui, Hawaii	Wesley S. Moore, MD
1993	Sonoma, CA	John M. Porter, MD
1994	Santa Barbara, CA	Eugene F. Bernstein, MD
1995	Phoenix, AZ	Robert L. Kistner, MD
1996	Dana Point, CA	Jerry Goldstone, MD
1997	Lana'I, Hawaii	Richard L. Treiman, MD
1998	Whistler, BC, Canada	Kaj H. Johansen, MD
1999	Lake Tahoe, NV	Ralph B. Dilley, MD
2000	Coeur d'Alene, ID	Peter F. Lawrence, MD
2001	Santa Fe, NM	William C. Krupski, MD
2002	Newport Beach, CA	Cornelius Olcott, IV, MD
2003	Kona, Hawaii	Lloyd M. Taylor, Jr., MD
2004	Victoria, BC, Canada	J. Dennis Baker, MD
2005	Park City, Utah	Gregory L. Moneta, MD
2006	La Jolla, CA	George Andros, MD
2007	Kona, Hawaii	Jeffrey L. Ballard, MD
2008	Napa, CA	Alexander W. Clowes, MD
2009	Tucson, AZ	Fred A. Weaver, MD
2010	Sunriver, OR	Linda M. Reilly, MD
2011	Kauai, HI	Ronald L. Dalman, MD
2012	Park City, UT	William J. Quinones-Baldrich, MD
2013	Jasper, AB, Canada	Joseph L. Mills, Sr., MD
2014	Coronado, CA	Peter A. Schneider, MD

SECRETARIES-TREASURERS

1986 - 1990	Wesley S. Moore, MD
1990 - 1993	J. Dennis Baker, MD
1993 - 1996	P. Michael McCart, MD
1996 - 1999	Gregory L. Moneta, MD
1999 - 2000	Terence M. Quigley, MD
2000 - 2002	Julie A. Freischlag, MD
2002 - 2005	Jeffrey L. Ballard, MD
2005 - 2008	Joseph L. Mills, MD
2008 - 2011	Larry W. Kraiss, MD
2011 - 2014	E. John Harris, Jr., MD
2014 - Present	York N. Hsiang, MB, MHSc

RECORDERS

1987 - 1989	Victor M. Bernhard, MD
1989 - 1992	Eugene F. Bernstein, MD
1992 - 1995	Peter F. Lawrence, MD
1995 - 1998	William C. Krupski, MD
1998 - 2001	Roy L. Tawes, MD
2001 - 2004	Ronald L. Dalman, MD
2004 - 2007	Peter A. Schneider, MD
2007 - 2010	William C. Pevec, MD
2010 - 2013	Steven Katz, MD
2013 - Present	Benjamin W. Starnes, MD

NEWS MEMBERS ELECTED IN 2014

Zachary M. Arthurs, MD
Kevin Casey, MD
Robert W. Chang, MD
Marlene Grenon, MD
Misty Humphries, MD
Omid Jazaeri, MD
William Ming Lee, MD
Stephanie C. Lin, MD
John Marek, MD
Elina Quiroga, MD
Sherene Shalhub, MD
Matthew P. Sweet, MD
Shant M. Vartanian, MD

WVS PRESIDENTIAL GUEST LECTURERS

1986	Emerick Szilagyi	2002	Thomas R. Russell
1987	None	2003	None
1988	James Stanley	2004	None
1989	Brian Thiele	2005	Kevin G. Burnand
1990	Frank Veith	2006	Jean Pierre Becquemin
1991	Allan Callow	2007	None
1992	Malcolm Perry	2008	John H. N. Wolfe
1993	Norman Hertzner	2009	Jack L. Cronenwett
1994	Norman Browse	2010	None
1995	Calvin Ernst	2011	Germano Melissano
1996	Anthony Whittemore	2012	Roy K. Greenberg Hazim J. Safi
1997	None	2013	Spence M. Taylor
1998	None	2014	Alan B. Lumsden
1999	Jonathan Towne	2015	Peter Gloviczki
2000	R. Thomas Grayston		
2001	William Hiatt		

GENERAL INFORMATION

EDUCATIONAL OBJECTIVES & METHODS

The 30th Annual Meeting of the Western Vascular Society was established with the specific purpose of advancing the art and science of vascular surgery, a goal that directly addresses competence, practice performance and patient outcomes. The majority of the educational content includes scientific presentations by members, sponsored guests and residents selected by the WVS Program Committee.

Learning Objective(s) - At the end of this activity, participants will be able to:

1. Better understand the role of carotid plaque morphology in developing symptoms
2. Develop a rationale for choosing different forms of anesthesia for CEA, while minimizing cardiac complications
3. Understand the natural history of thoracic aneurysms, as well as potential medical influences on aneurysm growth/rupture
4. Understand the advances in branched and fenestrated endografting, as well as longer-term results following the placement of such grafts
5. Understand the role of D-dimer studies in diagnosing DVT, as well as the impact of raising the threshold for a positive study using D-dimer
6. Better understand the early progress in the use of stent grafts for the treatment of ascending aortic lesions
7. Understand the relationship between the clinical impact of claudication and traditional grading systems for the severity of the vascular lesions
8. Appreciate factors that lead to readmission of vascular patients following operation

CONTINUING MEDICAL EDUCATION CREDIT INFORMATION

ACCREDITATION

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education through the joint providership of the American College of Surgeons and the Western Vascular Society. The American College of Surgeons is accredited by the ACCME to provide continuing medical education (CME) for physicians.

AMA PRA CATEGORY 1 CREDITS™

The American College of Surgeons designates this live activity for a maximum of 14.00 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Of the *AMA PRA Category 1 Credits™* listed above, a maximum of 10.25 credits meet the requirements for Self-Assessment.



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Accreditation Council for Continuing Medical Education*

ACKNOWLEDGEMENTS

The Western Vascular Society wishes to recognize and thank the following companies for their ongoing support through educational grants:

Cook Medical
Medtronic, Inc.
W. L. Gore & Associates, Inc.

DISCLOSURE INFORMATION

In compliance with ACCME Accreditation Criteria, the American College of Surgeons, as the accredited provider of this activity, must ensure that anyone in a position to control the content of the educational activity has disclosed all relevant financial relationships with any commercial interest. All reported conflicts are managed by a designated official to ensure a bias-free presentation. Please see the insert to this program for the complete disclosure list.

SCHEDULE OF EVENTS

SATURDAY, SEPTEMBER 19, 2015

- 12:00 pm – 4:30 pm **Executive Council Meeting**
Members of the WVS Executive Council & Committee Chairs
- 6:00 pm – 7:30 pm **WELCOME RECEPTION**
Dress Code: Island casual—event is outdoors.

SUNDAY, SEPTEMBER 20, 2015

- 7:15 am – 8:00 am **Continental Breakfast With Educational Exhibitors**
- 7:45 am – 8:00 am **Call To Order and Announcements**
- 8:00 am – 9:30 am** **SCIENTIFIC SESSION I**
- 9:30 am – 10:00 am **Refreshment Break With Educational Exhibitors**
- 10:00 am – 11:50 am** **SCIENTIFIC SESSION II**
- 1:00 pm – 4:00 pm** **COMBINED WVS/AUSTRALIA AND NEW ZEALAND SOCIETY FOR VASCULAR SURGERY**
Trainee Simulation Skills Symposium
- 4:30 pm – 5:00 pm** **FELLOW LUMINARIES**
Maximizing Job Opportunities
Panel Discussion and Interaction With ANZSVS
- 6:00 pm – 10:00 pm** **WVS EVENT**
A Hawaiian Evening (Reception, Dinner & Entertainment)
Dress Code: Island casual—event is outdoors.

MONDAY, SEPTEMBER 21, 2015

- 7:30 am – 8:00 am **Continental Breakfast With Educational Exhibitors**
- 8:00 am – 9:30 am** **SCIENTIFIC SESSION III**

9:30 am – 10:00 am	Refreshment Break With Educational Exhibitors
11:10 am – 12:00 pm	WVS Business Meeting
12:00 pm – 12:45 pm	Lunch Break
1:00 pm – 2:30 pm	WVS/ANZSVS SESSION I
2:30 pm – 3:00 pm	Afternoon Refreshment Break (ANZ)
3:00 pm – 5:00 pm	TRAINEE RESEARCH PRESENTATIONS <i>Selected Presentations from the WVS and Australian and New Zealand SVS</i>
7:00 pm – 10:00 pm	WVS EVENT Presidents Reception, Dinner & Entertainment <i>Dress Code: Island smart casual—event is outdoors.</i>

TUESDAY, SEPTEMBER 22, 2015

7:30 am – 8:00 am	Continental Breakfast With Educational Exhibitors
8:00 am – 12:00 pm	WVS/ANZSVS SESSION II
8:00 am – 10:00 am	TRAINEE RESEARCH PRESENTATIONS <i>Selected Presentations from the WVS and Australian and New Zealand SVS</i>
10:00 am – 10:30 am	Refreshment Break With Educational Exhibitors
10:30 am – 11:10 am	PRESIDENT'S SESSION
11:15 am – 12:00 pm	Combined WVS/ANZSVS Session on Audit and Quality Control in Vascular Surgery
12:00 pm	Meeting Adjourns

NOTES

INSTRUCTIONS TO AUTHORS

Authors presenting papers are reminded that the presentation of the paper shall be limited to the following:

Full Presentation: 8-minute presentation, 2-minutes invited discussion and 10-minute general discussion

Mini Presentation: 5-minute presentation, 5-minutes general discussion

Best Trainee Presentation(s): 8-minute presentation, 4-minutes general discussion

Invited Discussant: 2-minutes to specifically critique the paper as presented. Visual aids may not be incorporated into the discussion. An electronic copy of the discussion is required.

Audio/Visual: The audio/visual available will be PowerPoint. Authors are to provide their presentation to the technician at least one (1) hour prior to the beginning of the session in which they are to present. Authors presenting in the Trainee Research Sessions will be utilizing the support of the audio/visual services of the Australian-New Zealand Society for Vascular Surgery.

Manuscripts: Authors are required to submit a manuscript of their presentation for possible publication in the *Journal of Vascular Surgery Publications* within one month of the Annual Meeting. The editors of the *Journal of Vascular Surgery Publications* will determine the Journal in which accepted manuscripts will be published.

The guidelines for submission of your manuscript(s) may be found on the Journal of Vascular Surgery Publications website (www.editorialmanager.com/jvs). Please refer to the "Instructions for Authors." Once the manuscript is submitted to the Journal by email, please send a confirmation of submission to Dr. Benjamin W. Starnes, WVS Recorder, at starnes@uw.edu.

The Annual Meeting registration desk will be located in the **LLima Pre-Function Foyer** and open during the following hours:

Saturday, September 19	4:00 pm – 8:00 p.m
Sunday, September 20	7:00 am – 2:00 pm
Monday, September 21	7:00 am – 2:00 pm
Tuesday, September 22	7:00 am – 11:00 am

NOTES

SCIENTIFIC PROGRAM

SATURDAY, SEPTEMBER 19, 2015

- 12:00 pm – 4:30 pm **Executive Council Meeting**
*Members of the WVS Executive Council &
Committee Chairs*
- 6:00 pm – 7:30 pm **WELCOME RECEPTION**
Dress Code: Island casual—event is outdoors.

SUNDAY, SEPTEMBER 20, 2015

- 7:15 am – 8:00 am **Continental Breakfast With Educational Exhibitors**
- 7:45 am – 8:00 am **Call To Order and Announcements**
Larry W. Kraiss, MD, President
- 8:00 am – 9:30 am** **SCIENTIFIC SESSION I**
Presiding: Larry W. Kraiss, MD & Benjamin W. Starnes, MD
- 8:00 am – 8:20 am 1.
Anesthetic Type and Risk of Myocardial Infarction Following Carotid Endarterectomy In the Carotid Revascularization Endarterectomy Versus Stenting Trial (CREST)
Robert J. Hye¹, Jenifer H. Voeks², Mahmoud Malas³, MeeLee Tom⁴, Sonni Longson¹, Joseph L. Blackshear⁵, Thomas G. Brott⁵—¹Kaiser Permanente, San Diego, CA; ²Medical University of South Carolina, Charleston, SC; ³Johns Hopkins University, Baltimore, MD; ⁴Vascular Surgery, Rutgers University, Newark, NY; ⁵Mayo Clinic, Jacksonville, FL
Discussant: Peter F. Lawrence, MD, Los Angeles, CA

- 8:20 am – 8:40 am 2.
Correlation of Pre-Operative CTA Carotid Artery Plaque Morphology With Symptoms in Patients Undergoing Carotid Endarterectomy
Roy M. Fujitani¹, Trung Bui¹, Samuel E. Wilson², Russell A. Williams², Ian L. Gordon², Hahn V. Pham²—¹University of California Irvine, Orange, CA; ²VA Long Beach Healthcare System, Long Beach, CA
Discussant: Christian deVirgilio, MD, Torrance, CA
- 8:40 am – 9:00 am 3.
Rutherford Claudication Severity Compared To Patient Reported Quality of Life and Function
Rachel E. Heneghan¹, Beth Devine², Mark H. Meissner², Donald Patrick², Rebecca G. Symons³, Cheryl Armstrong³, Danielle Lavalée³, Ellen T. Farrokhi⁴, Alexander W. Clowes¹, David R. Flum³—¹University of Washington, Seattle, WA; ²University of Washington, CERTAIN-PAD Collaborative, Seattle, WA; ³Surgical Outcomes Research Center (SORCE), University of Washington, CERTAIN-PAD Collaborative, Seattle, WA; ⁴Providence Medical Group, Everett, WA
Discussant: Misty D. Humphries, MD, Sacramento, CA
- 9:00 am – 9:10 am 4.
The Fate of the Unstented Superior Mesenteric Artery in Fenestrated Endovascular Aortic Aneurysm Repair
Rachel E. Heneghan, R. Eugene Zierler, Benjamin W. Starnes—University of Washington, Seattle, WA
- 9:10am – 9:20 am 5.
3D Printed Patient-Specific Aortic Templates To Guide On-Table Fenestration of A Z-Fen Device: A True Off-the-Shelf Solution To Manage Juxtarenal Aneurysms
Benjamin W. Starnes, Daniel Leotta, Billi Tatum—University of Washington, Seattle, WA

- 9:20 am – 9:30 am 6.
Decalcification of Heavily Calcified Common Femoral Artery Utilizing Cavitron Ultrasonic Surgical Aspirator
Shusaku Maeda, Takashi Nakamura—Osaka Rosai Hospital, Sakai, Osaka, Japan
- 9:30 am – 10:00 am **Refreshment Break With Educational Exhibitors**
- 10:00 am – 11:50 am** **SCIENTIFIC SESSION II**
Presiding: Larry W. Kraiss, MD & David A. Rigberg, MD
- 10:00 am – 10:20 am 7.
Physician Modified Endovascular Grafts for Treatment of Juxtarenal Aortic Aneurysms: Midterm Results From An Investigator-Initiated Investigational Device Exemption (IDE) Clinical Trial
Benjamin W. Starnes, Rachel E. Heneghan, Billi Tatum—University of Washington, Seattle, WA
Discussant: Brian G. DeRubertis, MD, Los Angeles, CA
- 10:20 am – 10:40 am 8.
Natural History and Risk Factors for Rupture of Thoracic Aortic Arch Aneurysms
Rachel S. Yiu, Stephen W.K. Cheng—University of Hong Kong, Hong Kong, China
Discussant: John S. Lane, III, MD, La Jolla, CA
- 10:40 am – 11:00 am 9.
Institutional Quality Outcome Measures: Investigating the Impact of Raising the Positive D-Dimer Threshold for DVT As Confirmed By Duplex Ultrasound
Tazo Inui, Kelley D. Hodgkiss-Harlow, Kimberly Betti—Kaiser Permanente San Diego, San Diego, CA
Discussant: York N. Hsiang, MB, MHSc, Vancouver, BC, Canada

- 11:00 am – 11:20 am 10.
Midterm Results of the Use of Low Profile Multibranched Thoracoabdominal Aortic Stent Grafts
Bala Ramanan, Charlene C. Fernandez, Julia D. Sobel, Warren J. Gasper, Shant M. Vartanian, Linda M. Reilly, Timothy A. M. Chuter, Jade S. Hiramoto—University of California San Francisco, San Francisco, CA

Discussant: Omid Jazaeri, MD, Denver, CO
- 11:20 am – 11:30 am 11.
Closure of Retrograde Popliteal Artery Access Site With A Nitinol Clip Applier Device
Owen Palmer¹, Steven Katz², Fred Weaver², William Lee²—¹University of Southern California, South Pasadena, CA; ²University of Southern California, Los Angeles, CA
- 11:30 am – 11:40 am 12.
Suture Aneurysmorrhaphy for Salvage of Bleeding Arteriovenous Fistula Aneurysms
Bian Wu, Warren J. Gasper, Charles M. Eichler, Joseph H. Rapp, Christopher D. Owens, Michael S. Conte, Shant M. Vartanian—University of California, San Francisco, San Francisco, CA
- 11:40 am – 11:50 am 13.
Radial Artery Access for Peripheral Endovascular Procedures
Sam S. Ahn¹, Avnee J. Kumar², Michele N. Moe², Julia F. Chen²—¹University Vascular Group, DFW Vascular Group, Los Angeles, CA; ²UTSW, Dallas, TX
- 1:00 pm – 4:00 pm** **COMBINED WVS/AUSTRALIA AND NEW ZEALAND SOCIETY FOR VASCULAR SURGERY**
Trainee Simulation Skills Symposium

Welcome & Introductions
Robert Fitridge, MD, Jason T. Lee, MD, Irwin Mohan, MD & David A. Rigberg, MD

1:05 pm – 1:45 pm	STATION 1—Open AAA Simulation
1:50 pm – 2:20 pm	STATION 2—Open Carotid and Fem-Pop Simulation
	Break
2:35 pm – 3:15 pm	STATION 3—TEVAR Simulation
3:20 pm – 4:00 pm	STATION 4—EVAR and Ruptured EVAR Simulation
4:00 pm – 5:30 pm	COMBINED WVS/ANZSVS TRAINEES RECEPTION/PANEL DISCUSSION
4:30 pm – 5:00 pm	FELLOW LUMINARIES SESSION Maximizing Job Opportunities
	Transitioning From Academics To Group Practice Kai Johansen, MD
	Private Practice Realities Willis Wagner, MD
	Working for Kaiser Kelly Hodgkiss-Harlow, MD
	Who Should Go Into Academics Larry A. Kraiss, MD
	Panel Discussion and Interaction With ANZSVS
6:00 pm – 10:00 pm	WVS EVENT A Hawaiian Evening (Reception, Dinner & Entertainment) <i>Dress Code: Island casual—event is outdoors.</i>

MONDAY, SEPTEMBER 21, 2015

- 7:30 am – 8:00 am **Continental Breakfast With Educational Exhibitors**
- 8:00 am – 9:30 am** **SCIENTIFIC SESSION III**
Presiding: William C. Pevec, MD & Niten Singh, MD
- 8:00 am – 8:20 am 14.
Ascending Aortic Endovascular Repair (AAEVR) – Results of FDA Approved PS-IDE Feasibility Study
Rodney A. White, Carlos E. Donayre, Irwin Walot, Matthew Koopmann, George E. Kopchok, Ali Khoynzhad—Harbor-UCLA Medical Center, Torrance, CA/Cedars Sinai Medical Center, Los Angeles, CA
Discussant: Timothy A. M. Chuter, MD, San Francisco, CA
- 8:20 am – 8:40 am 15.
Does Metformin Suppress Aneurysmal Aortic Degeneration?
Ronald L. Dalman, Baohui Xu, Ellen Kettler, Jiang Xiong, Naoki Fujimura, Haojuan Xuan, Keith J. Glover, Sara A. Michie, Matthew W. Mell—Stanford University School of Medicine, Stanford, CA
Discussant: Roy M. Fujitani, MD, Orange, CA
- 8:40 am – 9:00 am. 16.
Drivers of Readmissions in Vascular Surgery Patients
Natalia O. Glebova¹, Michael Bronsert¹, Karl E. Hammermeister¹, Mark R. Nehler¹, James H. Black, III², William G. Henderson¹—¹University of Colorado Denver, Aurora, CO; ²Johns Hopkins Hospital, Baltimore, MD
Discussant: Shant M. Vanatanian, MD, San Francisco, CA

- 9:00 – 9:10 am 17.
Endovascular Management of Intraoperative Iliocaval Injuries With Commercially Available Endografts
Venita Chandra, Chelsea Dorsey, Benjamin Colvard, Jason T. Lee—Stanford University, Stanford, CA
- 9:10 am – 9:20 am 18.
A Comparative Analysis of the Influence of Stent Graft Design On Long-Term Outcomes After Endovascular Abdominal Aortic Aneurysm Repair
Neha Sheng, Ahmed M. Abou-Zamzam, Jr., Jason T. Chiriano, Phong T. Dargon, Theodore H. Teruya, Christian Bianchi—Loma Linda University Medical Center, Loma Linda, CA
- 9:20 am – 9:30 am 19.
Comparison of Vascular Remodeling and Integration Between the Bioresorbable Poly-L-Lactic Acid Scaffold Stent and the Metallic Stent in Porcine Iliac Artery
Hideaki Obara, Yasuhito Sekimoto, Kentaro Matsubara, Naoki Fujimura, Yuko Kitagawa—Keio University School of Medicine, Tokyo, Japan
- 9:30 am – 10:00 am **Refreshment Break With Educational Exhibitors**
- 10:00 am – 11:10 am SCIENTIFIC SESSION IV**
Presiding: William C. Pevec, MD & Benjamin M. Starnes, MD
- 10:00 am – 10:10 am 20.
Amputation Trends for Patients With Lower Extremity Wounds Due To Diabetes and Peripheral Artery Disease
Misty Humphries, Ann Brunson, Chin-Shang Li, Joy Melnikow, Patrick Romano—University of California-Davis, Sacramento, CA

- 10:10 am – 10:20 am 21.
The Use of Cryopreserved Allograft In Patients With Dialysis Access Failure and Infection
Michael Harlander-Locke¹, Peter Lawrence¹, Hugh Gelabert¹, James Kohn², Christopher Abularrage³, Michael Ricci⁴, Sotero Peralta⁵, Gary Lemmon⁶, Aamna Ali⁷, Jeffrey Hsu⁷—¹University of California Los Angeles, Los Angeles, CA; ²Doctors Hospital at White Rock Lake, Dallas, TX; ³Johns Hopkins, Baltimore, MD; ⁴Central Maine Medical Center, Lewiston, ME; ⁵Cleveland Clinic, Cleveland, OH; ⁶Indiana University, Indianapolis, IN; ⁷Kaiser Foundation Hospital, Fontana, CA
- 10:20 am – 10:30 am 22.
Post-Operative Outcomes Correlate With Frailty Defined Using Vascular Quality Initiative Data
Larry W. Kraiss, Ragheed Al-Dulaimi Julie Thelen, Benjamin S. Brooke—University of Utah, Salt Lake City, UT
- 10:30 am – 10:42 am 23.§
Blunt Aortic Injury: A Call for A New Classification System and Treatment Strategy
Rachel E. Heneghan, Shahram Aarabi, Niten Singh, Elina Quiroga, Nam Tran, Benjamin W. Starnes—University of Washington, Seattle, WA
- 10:42 am – 10:54 am 24.§
Does Gender or Use of Regional Anesthesia Have Influence on Carotid Endarterectomy Outcomes?
Michael D. Sgroi, Elizabeth L. Chou, Nii-Kabu Kabutey, Isabella J. Kuo, Roy M. Fujitani—University of California Irvine, Orange, CA
- 10:54 am – 11:06 am 25.§
Superior Mesenteric Artery Outcomes After Fenestrated Endovascular Aortic Aneurysm Repair
Salim Lala¹, Martyn Knowles¹, David E. Timaran¹, Mirza S. Baig¹, Rawson J. Valentine², Carlos H. Timaran¹—¹UT Southwestern, Dallas, TX; ²Vanderbilt University, Nashville, TN

Sponsored by: Roy M. Fujitani, MD

11:10 am – 12:00 pm	WVS Business Meeting
12:00 pm – 12:45 pm	Lunch Break
1:00 pm – 2:30 pm	WVS/ANZSVS SESSION I Presiding: William C. Pevec & Irwin V. Mohan
1:00 pm – 1:40 pm	DEBATE: Management of Chronic Ilio-Femoral Vein Thrombosis (Including May-Turners) With Poor Inflow: Endophlebectomy and Stenting Is the Best Modern Treatment, or Are There Better Alternatives?
1:00 pm – 1:15 pm	For, Endophlebectomy and Stenting Is the Best Modern Treatment Cees Wittens, Maastricht, Netherlands
1:15 pm – 1:30 pm	Against, No There Are Better Alternatives Peter Gloviczki, Rochester, MN
1:30 pm – 1:40 pm	Discussion, Q&A
1:40 pm – 1:50 pm	Vascular Training In the USA Jason Lee, Stanford, CA
1:50 pm – 2:00 pm	Vascular Training in Australia and New Zealand Thodur Vasudevan, Hamilton, Australia
2:00 pm – 2:10 pm	Technical Skills Assessment of Vascular Trainees – Analysis of Performance In A Bi-National Cohort Over Six Years Mark Jackson, Gold Coast, Australia
2:10 pm – 2:20 pm	Non-Technical Skills Training For the Operating Room Guil Pena, Adelaide, Australia
2:20 pm – 2:30 pm	Continued Evolution of Vascular Surgery Fellowship Graduate Operative Experience In the United States Jeffrey Jim, St. Louis, MO
2:30 pm – 3:00 pm	Afternoon Refreshment Break (ANZ)

3:00 pm – 5:00 pm

TRAINEE RESEARCH PRESENTATIONS

*Selected Presentations from the WVS and
Australian and New Zealand SVS*

Co-Chairs: Peter A. Schneider & John Quinn

VA004

**Improving Care and Outcomes for Older
Vascular Surgical Patients**

Alison Mudge, Prue Mcrae, Michael Reade, Peter
Donovan, Jason Jenkins, Melanie Foster, Philip
Walker—Royal Brisbane and Women's Hospital,
Queensland, Australia

26.§ (WVS)

**Survival and Reintervention Risk By Patient
Age and Preoperative Abdominal Aortic
Aneurysm (AAA) Diameter Following
Endovascular Aneurysm Repair (EVAR)**

Afra U. Janarious¹, Robert J. Hye¹, Priscilla H.
Chan¹, Guy Cafri¹, Robert W. Chang², Thomas F.
Rehring³, Nicolas A. Nelken⁴, Bradley B. Hill⁵—
¹Kaiser Permanente, San Diego, CA; ²Kaiser
Permanente, South San Francisco, CA; ³Kaiser
Permanente, Denver, CO; ⁴Kaiser Permanente,
Honolulu, HI; ⁵Kaiser Permanente, Santa Clara,
CA

VA009

**Evaluation of Aortic Diameters In A Population
Undergoing CT Xolonography: Prevalence and
Effect On Survival**

Manar Khashram, Anshuman Gupta, Mohamud
Osman, Greg Jones, Justin Roake - University of
Otago, Christchurch, Christchurch, New Zealand

27.§ (WVS)

Distance To the Base of Skull: A New Predictor of Complications In Carotid Body Tumor Resection

Gloria Y. Kim¹, Peter F. Lawrence¹, Alberto Munoz², Gustavo Oderich³, Kuauhyama Luna-Ortiz⁴, Steven Farley¹, Rameen S. Moridzadeh⁵, Vascular Low Frequency Disease Consortium¹—¹David Geffen School of Medicine at UCLA, Los Angeles, CA; ²Clinica Vascular de Bogota, Clinica Palermo, Universidad Nacional de Colombia, Bogota, Colombia; ³Mayo Clinic, Rochester, MN; ⁴Instituto Nacional de Cancerología, Tlalpan, Mexico; ⁵New York University School of Medicine, New York, NY

VA006

Procedural Benefits of Three-Dimensional Image Fusion Angiography During EVAR Are Associated With Improved Post-Operative Outcomes

Joseph Dawson, Lina Hua, Koah Doan, Nicholas Bajic, Robert Fittridge—University of Adelaide Discipline of Surgery, South Australia

28.§ (WVS)

Renal Function Changes Following Fenestrated EVAR

Kenneth Tran¹, Andres Fajardo², Brant Ullery¹, Christopher Goltz², Jason Lee¹—¹Stanford University, Stanford, CA; ²Indiana University, Indianapolis, IN

VA007

Review of Vascular Anterior Exposure For Anterior Lumbar Interbody Fusion

Mayo Theivendran, Cathy Thoo, Michael Mulcahy, Michael Neale, Vikram Puttaswamy—Royal North Shore Hospital, Sydney, Australia

29.§ (WVS)

Contemporary Outcomes Following Imaging-Guided Treatment of Patients With May-Thurner Syndrome

Johnathon C. Rollo, Steven Farley, Adam Oskowitz, Juan Carlos Jimenez, Brian DeRubertis—University of California Los Angeles, Los Angeles, CA

VA008

Five Year Results for Popliteal Aneurysm Surgery From the AVA: Graft Patency and Limb Loss Is Determined By ASA Grade, Conduit Quality, Runoff Vessels and Emergent Surgery

Chelsea Beinke, Irwin Mohan, Kerry Hitos, Bernie Bourke, Barry Beiles—Westmead Hospital, Sydney, Australia

30.§ (WVS)

A Comparison of Brachial Artery-Brachial Vein Arteriovenous Fistulas With AV Grafts In Patients With Poor Superficial Venous Anatomy

Jerry J. Kim, Ezinne J. Ihenachor, Aaron B. Parrish, Jenny D. Bleck, Matthew C. Koopmann, Christian de Virgilio—Harbor-UCLA Medical Center, Torrance, CA

7:00 pm – 10:00 pm

WVS EVENT

Presidents Reception, Dinner & Entertainment

Dress Code: Island smart casual—event is outdoors.

TUESDAY, SEPTEMBER 22, 2015

7:30 am – 8:00 am

Continental Breakfast With Educational Exhibitors

8:00 am – 12:00 pm

WVS/ANZSVS SESSION II

Co-Chairs: Jason Lee & Andrew Hill

8:00 am – 10:00 am

TRAINEE RESEARCH PRESENTATIONS

*Selected Presentations from the WVS and
Australian and New Zealand SVS*

VA016

**Five Year Result of Aortic Intervention in the
AVA Increasing Complexity of Open Surgery,
ASA Grade and Symptomatic Patients Increase
Risks**

Daniel Nguyen, Kerry Hitos, Bernie Bourke, Barry
Beiles, Irwin Mohan—Westmead Hospital, NSW

31.§ (WVS)

**Arterial Cut-Down Reduces Complications
Following Brachial Access for Peripheral
Vascular Interventions**

Marcus R. Kret¹, Ronald L. Dalman², Jeffrey
Kalish³, Matthew W. Mell²—¹Stanford University
Medical Center, Stanford, CA; ²Stanford
University School of Medicine, Stanford, CA;
³Boston Medical Center, Boston, MA

VA010

**Independence of Extent of Tortuosity and
Calcification In Iliac Arteries**

Benjamin Thurston, Nicholas Dowson, Prue
Cowled, Margaret Boulton, Robert Fitridge—
University of Adelaide, Adelaide, Australia

32.§ (WVS)

**SPY Technology As A Valuable Measure for
Lower Extremity Interventions—A Prospective
Evaluation**

Benjamin Colvard¹, Elizabeth Hitchner², Qingfeng
Sun³, Becky Long⁴, George Lee¹, Oliver Aalami¹,
Wei Zhou¹—¹Stanford University, Stanford, CA;
²VA Medical Center - Palo Alto, Palo Alto, CA;
³Harbin Medical University, Harbin, China; ⁴VA
Medical Center Palo Alto, Palo Alto, CA

VA011

**Blood Product Ordering Prior To Elective
Surgery**

Shrikkanth Rangarajan, Andrew Hughes, Douglas
Stupart, Martin Mccall-White—Geelong Hospital,
Geelong, Australia

33.§ (WVS)

The Impact of Exposure Technique on Perioperative Complications In Patients Undergoing Open Abdominal Aortic Aneurysm Repair

Pedro G. Teixeira¹, Karen Woo¹, Ahmed M. Abou-Zamzam², Sara L. Zettervall³, Marc Schermerhorn³, Fred A. Weaver, MMM¹—¹University of Southern California, Los Angeles, CA; ²Loma Linda University, Loma Linda, CA; ³Beth Israel Deaconess Medical Center, Boston, MA

VA022

An Endovascular-First Approach for the Treatment of Critical Limb Ischemia Results in Superior Limb Salvage Rates

Taraneh Amir-Nezami, Sydney, Australia

34.§ (WVS)

Aortic Outflow Occlusion Predicts Rupture of Abdominal Aortic Aneurysm

Jeffrey D. Crawford, Nasibeh Vatankhah, Colin Bohannon, Stephen Haller, Venkat Keshav, Sandra Rugonyi, Erica L. Mitchell, Gregory J. Landry, Gregory L. Moneta, Amir F. Azarbal—Oregon Health and Sciences University, Portland, OR

VA024

Effects of Topical Negative Pressure Therapy on Tissue Oxygenation and Wound Healing in Vascular Foot Wounds

Nathaniel Chiang, Thodur Vasudevan, Jamie Sleigh—Waikato Hospital, Waikato, New Zealand

35.§ (WVS)

A Comparison of RUDI and DRIL for the Management of Severe Access-Related Hand Ischemia

Jonathan D. Misskey, Cathevine Yang, Shaun MacDonald, York Hsiang—University of British Columbia, Vancouver, BC, Canada

10:00 am – 10:30 am

Refreshment Break With Educational Exhibitors

10:30 am – 11:10 am	PRESIDENT'S SESSION Presiding: Larry W. Kraiss & Douglas Cavaye
10:30 am – 10:35 am	Address from the President of the WVS Larry W. Kraiss
10:35 am – 10:40 am	Address from the President of the ANZSVS Douglas Cavaye
10:40 am – 10:55 am	Best Evidence-Based Management of DVT and Its Complications Is No Longer Anticoagulations and Stockings—We Have Moved On Cees Wittens , Maastricht, Netherlands
10:55 am – 11:10 am	The Popliteal Aneurysm Conundrum: Open Surgery or Endovascular Repair? Peter Gloviczki Rochester, MN
11:10 am – 11:15 am	Q & A
11:15 am – 12:00 pm	COMBINED WVS/ANZSVS SESSION ON AUDIT AND QUALITY CONTROL IN VASCULAR SURGERY
11:15 am – 11:25 am	Global Vascular Guidelines Update Michael S. Conte, San Francisco, CA
11:25 am – 11:35 am	Challenges, Usefulness and Accuracy of Data In the AVA: The ANZSVS Experience C. Barry Beiles, Melbourne, Australia
11:35 am – 11:45 am	Challenges, Usefulness and Accuracy of Data In the VQI: The US Experience Larry W. Kraiss, Salt Lake City, UT
11:45 am – 11:50 am	Q & A
11:50 am – 12:00 pm	TRAINEE PRIZE PRESENTATION
12:00 pm	Meeting Adjourns

NOTES

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SCIENTIFIC SESSION ABSTRACTS

SATURDAY, SEPTEMBER 19, 2015

- 12:00 pm – 4:30 pm **Executive Council Meeting**
*Members of the WVS Executive Council &
Committee Chairs*
- 6:00 pm – 7:30 pm **WELCOME RECEPTION**
Dress Code: Island casual—event is outdoors.

SUNDAY, SEPTEMBER 20, 2015

- 7:15 am – 8:00 am **Continental Breakfast With Educational Exhibitors**
- 7:45 am – 8:00 am **Call To Order and Announcements**
Larry W. Kraiss, MD, President
- 8:00 am – 9:30 am** **SCIENTIFIC SESSION I**
Presiding: Larry W. Kraiss, MD & Benjamin W. Starnes, MD

SUNDAY

8:00 am – 8:20 am

1.
Anesthetic Type and Risk of Myocardial Infarction Following Carotid Endarterectomy In the Carotid Revascularization Endarterectomy Versus Stenting Trial (CREST)

Robert J. Hye¹, Jenifer H. Voeks², Mahmoud Malas³, MeeLee Tom⁴, Sonni Longson¹, Joseph L. Blackshear⁵, Thomas G. Brott⁵—¹Kaiser Permanente, San Diego, CA; ²Medical University of South Carolina, Charleston, SC; ³Johns Hopkins University, Baltimore, MD; ⁴Vascular Surgery, Rutgers University, Newark, NY; ⁵Mayo Clinic, Jacksonville, FL

Discussant: Peter F. Lawrence, MD, Los Angeles, CA

OBJECTIVES: Most carotid endarterectomy (CEA) procedures are performed under general anesthesia (GA) although some advocate regional anesthesia (RA) to reduce hemodynamic instability, allow neurologic monitoring and selective shunting. RA does not reduce risk of periprocedural stroke or death, although some series show a reduction in MI. The incidence of periprocedural MI, death and stroke was compared in the surgical cohort of CREST between patients undergoing CEA under GA and RA, as well as the carotid artery stenting (CAS) cohort.

METHODS: Between 2000 and 2008, 1151 patients underwent CEA and 1123 patients underwent CAS within 30 days of randomization in CREST. CEA patients were categorized by anesthetic type (GA vs RA). The incidence of periprocedural primary endpoint (any stroke, death or protocol MI), MI (protocol MI plus troponin only MI), stroke, and stroke or death was compared between patients undergoing CEA under GA, RA and those undergoing CAS. CREST defined protocol MI as chest pain or ECG change plus biochemical evidence of MI. Simple statistics were used to assess differences in baseline characteristics and periprocedural events. Logistic regression was used to assess differences in periprocedural events between those undergoing CEA under GA, RA and those having CAS.

RESULTS: The three groups had similar demographic risk factors except for symptomatic status (p=0.03). Risk of periprocedural MI was significantly lower in patients undergoing CAS, and CEA under RA as compared to GA (p = 0.04) (Fig 1). Logistic regression showed that patients undergoing CEA under GA had lower odds of a periprocedural stroke [OR 0.48 (0.28,0.79)] and stroke or death [OR 0.46 (0.27,0.76)] when compared to those undergoing CAS but were not significantly different than those undergoing CEA-RA. Conversely, patients undergoing CEA-GA had twice the risk of protocol MI or troponin only

MI when compared to those undergoing CAS or CEA-RA [OR 2.01 (1.14,3.54)](Table 1).

CONCLUSIONS: In CREST, patients undergoing CEA under RA had equivalent risk of periprocedural MI as those undergoing CAS and almost half the risk of those undergoing CEA under GA. Since periprocedural MI is one of few variables favoring CAS over CEA, and has been associated with decreased long term survival, RA should be strongly considered for patients undergoing CEA.

Figure 1. MI-free survival curves of patients undergoing CAS, CEA with GA and CEA with RA.

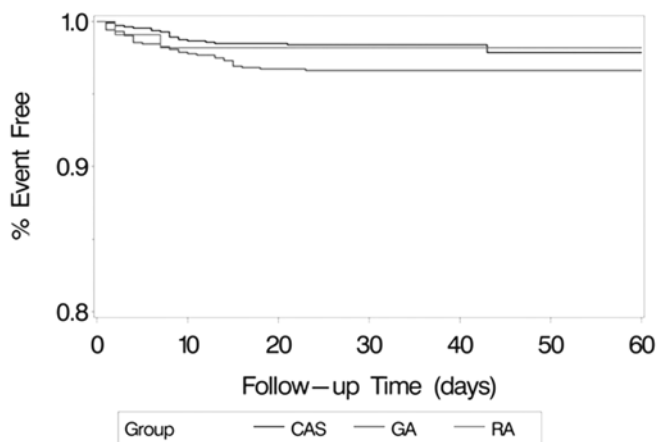


Table 1. Risk of periprocedural events in patients undergoing CAS, CEA with GA and CEA with RA.

Periprocedural Events	Odds Ratio (95% CI)* CAS as the Reference Group			Odds Ratio (95% CI) Comparing CEA-RA vs CEA-GA with CEA- GA as reference
	CAS	CEA - RA*	CEA- GA	
Composite endpoint (any Stroke, Death or Protocol MI)	reference	0.17 (0.02, 1.22)	0.82 (0.55, 1.22)	0.20 (0.03, 1.49)
Protocol + troponin only MI	reference	1.07 (0.25, 4.66)	2.01 (1.14, 3.54)	0.53 (0.13, 2.25)
Stroke	reference	0.21 (0.03, 1.53)	0.48 (0.28, 0.79)	0.44 (0.06, 3.30)
Stroke or death	reference	0.20 (0.03, 1.47)	0.46 (0.27, 0.76)	0.44 (0.06, 3.31)

*adjusted for age and symptomatic status

8:20 am – 8:40 am

2.

Correlation of Pre-Operative CTA Carotid Artery Plaque Morphology With Symptoms in Patients Undergoing Carotid Endarterectomy

Roy M. Fujitani¹, Trung Bui¹, Samuel E. Wilson², Russell A. Williams², Ian L. Gordon², Hahn V. Pham²—¹University of California Irvine, Orange, CA; ²VA Long Beach Healthcare System, Long Beach, CA

Discussant: Christian deVirgilio, MD, Torrance, CA

OBJECTIVES: Complexities in carotid artery plaque morphology, including surface irregularities/ulcerations, calcification, lipid-laden/hemorrhagic core, and hemodynamically significant stenoses are potential predictors of thromboembolic risk leading to ipsilateral neurologic symptoms. This study analyzes the correlation between helical CTA images of plaque morphology to neurologic symptoms in patients undergoing carotid endarterectomy.

METHODS: 89 consecutive patients (78 men, 11 women), ages 50-84 years, had 94 primary carotid endarterectomy for symptomatic (TIA, amaurosis fugax, or stroke) (39/94; 41%); or asymptomatic (55/94; 59%) disease. All patients had preoperative duplex ultrasonography and adjunctive thin-slice axial CTA to image the characteristic and severity of stenosis at the carotid bifurcation. Serial axial and maximal intensity projection CTA images were evaluated for severity and location of stenoses, luminal shape, presence of surface irregularities/ulceration, and plaque characteristics. Associated clinical symptoms were correlated to these CTA images of plaque morphology.

RESULTS: Surface irregularities/ulcerations were seen in 25/39 (64%) of the symptomatic; and 6/55 (11%) of the asymptomatic patients. 28/31 (90%) of ulcerations were identified at locations remote from the area of maximal stenosis, particularly overlying mixed plaque composition of calcification and lipid-laden or hemorrhagic core. Average maximal carotid stenosis was 68.5% in symptomatic; and 81.7% in asymptomatic patients. Greatest luminal stenosis was located in the common carotid artery (n=5); carotid bifurcation (n=24) and internal carotid artery (n=65). The residual carotid artery lumen was circular (28/94; 30%); elliptical (39/94; 41%); crescentic (19/94; 20%); and irregular (8/94; 9%) in shape. The bulk of the plaque was located opposite the flow divider (87%).

SUNDAY

CONCLUSIONS: The presence of surface irregularities and ulcerations in hemodynamically significant stenotic plaques, regardless of location, correlated best with the occurrence of ipsilateral neurologic symptoms. There was an inverse correlation between diameter reduction and symptomatology, reinforcing the importance of plaque characteristic and surface morphology in the etiology of thromboembolic events

8:40 am – 9:00 am

3.

Rutherford Claudication Severity Compared To Patient Reported Quality of Life and Function

Rachel E. Heneghan¹, Beth Devine², Mark H. Meissner², Donald Patrick², Rebecca G. Symons³, Cheryl Armstrong³, Danielle Lavallee³, Ellen T. Farrokhi⁴, Alexander W. Clowes¹, David R. Flum³—¹University of Washington, Seattle, WA; ²University of Washington, CERTAIN-PAD Collaborative, Seattle, WA; ³Surgical Outcomes Research Center (SORCE), University of Washington, CERTAIN-PAD Collaborative, Seattle, WA; ⁴Providence Medical Group, Everett, WA

Discussant: Misty D. Humphries, MD, Sacramento, CA

SUNDAY

OBJECTIVES: Compare patient reported claudication-related quality of life (QoL) and function with physician classification of disease severity, with the goal of developing a more patient-centered assessment tool.

METHODS: Consecutive patients with leg pain and diagnosis of isolated infrainguinal disease were evaluated from 2011-2013 with the Vascular Quality of Life Questionnaire (VascuQoL) and Walking Impairment Questionnaire (WIQ). Patient scores were divided in tertiles and concordance performed to clinician-reported Rutherford assessment (mild, moderate, or severe).

RESULTS: Of 323 patients enrolled, 225 participants completed all three measures (VascuQoL, WIQ, and Rutherford) and were included in the analysis (Mean age 70.7 years (SD±9.7); males, 70.7%). Mean VascuQoL score was 4.72 (SD±1.2) out of 7 (1, lowest; 7, highest). Mean WIQ distance score was 34.7 (SD±29.9), out of 100 (lower score indicates lower function). The tertile ranges for the VascuQoL were: low (1.4-4.1), moderate (4.2-5.4), and high (5.4-6.9). For the WIQ the tertiles were: low (0-13.7), moderate (13.9-44.5), and high (44.6-100). The correlation between the WIQ or VascuQoL score and the Rutherford index were low (Table 1), rho = -0.34, p<0.001 and rho = -0.38, p<0.001, respectively. In patients reporting low QoL, 54% were classified by physicians as severe claudicants, 33% as moderate, and 13% as mild. In patients reporting high QoL, 59% were classified as mild, 23% as moderate, and 18% as severe. Similarly, in patients reporting low walking function, 55% were classified as severe, 29% as moderate, and 16% as mild. In patients reporting high function, 21% were classified as severe, 26% as moderate, and 53% as mild. Lastly, the mean ABI for the Rutherford categories were 0.68, 0.68, and 0.62 for mild, moderate and severe claudication, respectively (p=0.12). The ABI to Rutherford association was low (rho = 0.2217, p = 0.002).

CONCLUSIONS: There is significant discordance between quality of life and functional impairment due to claudication as reported by patients and as assessed by clinicians. Physicians overestimate impact of mild claudication and underestimate impact of severe claudication in 50-60% of patients. In this era of patient-centered healthcare, a tool that accounts for patient perception of disease severity is warranted.

Table 1. Number and percentage of patients from each survey category by physician assigned claudication severity.

Rutherford classification	VascuQoL Category		
	Low QoL N=84 n (%)	Moderate QoL N=76 n (%)	High QoL N=61 n (%)
Mild	11 (13)	27 (36)	36 (59)
Moderate	28 (33)	18 (24)	14 (23)
Severe	45 (54)	31 (41)	11 (18)
Rutherford classification	WIQ Distance Category		
	Low function N=82 n (%)	Moderate Function N=71 n (%)	High Function N=66 n (%)
Mild	13 (16)	26 (37)	35 (53)
Moderate	24 (29)	19 (27)	17 (26)
Severe	45 (55)	26 (37)	14 (21)

9:00 am – 9:10 am

4.

The Fate of the Unstented Superior Mesenteric Artery in Fenestrated Endovascular Aortic Aneurysm Repair

Rachel E. Heneghan, R. Eugene Zierler, Benjamin W. Starnes—University of Washington, Seattle, WA

SUNDAY

OBJECTIVES: To evaluate the patency of the unstented superior mesenteric artery (SMA) after fenestrated EVAR (F-EVAR) using duplex ultrasound (DUS) and/or computed-tomography angiography (CTA).

METHODS: Patients with SMA fenestrations, scallops, or struts were identified from a database of patients who underwent F-EVAR at our institution between 2010 and 2014. Mesenteric DUS and CTA data were obtained at baseline and at 30-day, 6-month, 1, 2, and 3-year follow-up. The DUS parameter of SMA peak systolic velocity (PSV) ≥ 275 cm/s was used to detect $\geq 70\%$ SMA stenosis. CTA was used to evaluate the patency of the SMA when DUS PSV was elevated, or if DUS was not performed.

RESULTS: Sixty-nine patients underwent endograft placement involving the SMA in association with F-EVAR. There were 41 fenestrations, 7 scallops, and 21 bare metal struts crossing the SMA. Forty-two patients had baseline and at least 30-day follow-up DUS SMA PSV measurements (28 fenestrations, 14 struts). Median follow-up was 1 year (range 30 days-3 years). Among the 42 patients with follow-up imaging (Table 1) mean SMA PSV was 151 cm/s at baseline, 159 cm/sec at 30-day follow-up, 184 cm/sec at 6 months, 198 cm/sec at 1 year, 205 cm/sec at 2 years, and 170 cm/sec at 3 years. These differences were statistically significant at 6 months, 1 year, and 2 years when combined, and were significant in the fenestrated SMA group at 1 and 2 years ($p=0.047$, $p=0.047$) when velocities were separated into fenestrated versus strut crossed SMAs. Baseline velocities were not different between cohorts ($p=0.73$). Despite the statistically significant elevation in velocities after F-EVAR, the mean PSVs remained well below the threshold velocity of 275cm/s for native atherosclerotic $\geq 70\%$ SMA stenosis. Fifty-four patients had at least 30-day follow-up with CTA, and all had widely patent SMAs at last follow-up. There was one secondary intervention for asymptomatic SMA stenosis requiring stent placement one year after F-EVAR. There were no endoleaks related to SMA fenestrations.

CONCLUSIONS: The unstented SMA in association with F-EVAR remains widely patent in the presence of fenestrations or struts and is not associated with endoleaks. Follow-up DUS and CTA surveillance confirms that SMA patency remains in the normal or <70% stenosis range after F-EVAR.

Table 1. Fenestrated and strutted SMA ultrasound velocities at baseline and follow-up.

	Mean PSV (\pm SD), N pts					
SMA involvement	Baseline	30-days	6 months	1 year	2 year	3 year
Fenestrated	150 cm/s (\pm 68.9), 28	165 cm/s (\pm 62.2), 24	197 cm/s (\pm 91.3), 18	223 cm/s (\pm 105), 18	229 cm/s (\pm 101.8), 10	170 cm/s (\pm 54.3), 5
p-value		P=0.193	P=0.061	P=0.047	P=0.047	P=0.225
Struts	158 cm/s, (\pm 56.6), 14	155 cm/s (\pm 51.6), 14	135 cm/s (\pm 101.5), 12	127 cm/s (\pm 41.1), 8	158 cm/s (\pm 88.1), 5	N/A
p-value		P=0.695	P=0.508	P=0.917	P=0.686	
Combined	151 cm/s (\pm 61.4), 42	159 cm/s (\pm 59.3), 41	184 cm/s (\pm 88.2), 32	198 cm/s (\pm 100.5), 27	205 cm/s (\pm 100.4), 15	170 cm/s (\pm 54.3), 5
p-value	P=.730	P=0.163	P=0.024	P=0.013	P=0.041	P=0.138

9:10am – 9:20 am

5.
**3D Printed Patient-Specific Aortic Templates
To Guide On-Table Fenestration of A Z-Fen
Device: A True Off-the-Shelf Solution To
Manage Juxtarenal Aneurysms**
Benjamin W. Starnes, Daniel Leotta, Billi Tatum—
University of Washington, Seattle, WA

SUNDAY

OBJECTIVE: To describe a novel technique for custom fenestration of an existing pre-fenestrated device using a patient-specific three-dimensional printed aortic template.

METHODS: As part of an Investigational Device Exemption (IDE) Clinical Trial with the Food and Drug Administration, custom software was developed to guide precise device planning using a 3D Printed Aortic Template. Informed patient consent was obtained. A ZFEN device with a pre-fabricated large scallop for the SMA and pre-existing constraining ties was inserted into a sterilized 3D patient-specific aortic template (Figure 1), unsheathed and fenestrations for each of two renal arteries specifically marked. Reinforced fenestrations were created with gold markers and the device was re-sheathed. A four minute technical video was created.

RESULTS: The device was used to successfully repair a juxta-renal aortic aneurysm with selection and stenting of both renal arteries and absence of endoleak. Graft modification time was under 30 minutes. Fluoro time was 14.7 minutes and operative time 74 minutes.

CONCLUSIONS: This technique describes the first successful use of a 3D printed aortic template to guide precise location of renal fenestrations and successful treatment of a juxta-renal aortic aneurysm in man. With increasing speed of 3-D printers, this technique promises to increase the number of aortic aneurysms that can successfully be treated with "off-the-shelf" endovascular techniques. The future promises patient-specific endovascular therapies to treat all patients with custom made devices.



9:20 am – 9:30 am

6.

Decalcification of Heavily Calcified Common Femoral Artery Utilizing Cavitron Ultrasonic Surgical Aspirator

Shusaku Maeda, Takashi Nakamura—Osaka Rosai Hospital, Sakai, Osaka, Japan

SUNDAY

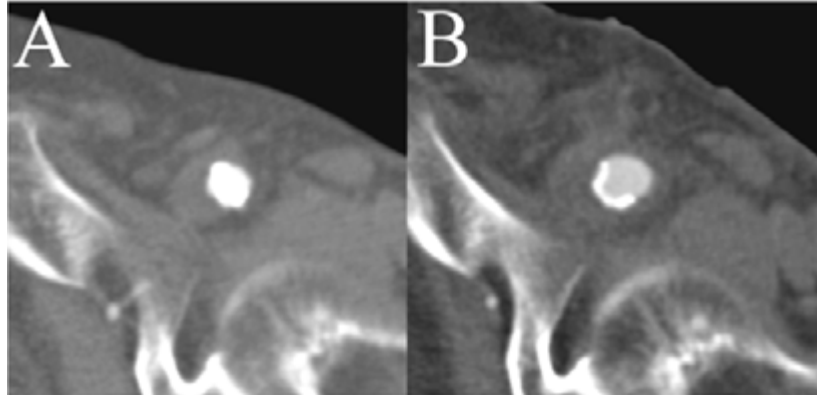
OBJECTIVE: Surgical endarterectomy is the preferred method for occlusive disease of the common femoral artery (CFA). However, that treatment is not always straightforward in cases with heavily calcified plaque. To overcome this limitation, we developed a simple and effective method for decalcification that utilizes the Cavitron ultrasonic surgical aspirator (CUSA).

METHODS: Our method involves full exposure of the calcified lesion. Following an arteriotomy, protruding calcification is removed using the probe of the CUSA (SonoSurg, Olympus, Tokyo), while taking care to avoid vessel perforation. Preservation of the medial calcified layer can be performed by accurate control provided by the device, which enables smooth termination in the distal area of the normal wall and does not usually require a tacking suture. Decalcification of the arteriotomy line reduces the risk of fraying sutures and secures a vein patch angioplasty (Fig. 1). We retrospectively reviewed our experience with this procedure.

RESULTS: A total of 12 patients [2 females (17%), average age 71 years (range 57-83 years), 8 (67%) with diabetes, 6 (50%) on hemodialysis] underwent 13 CFA angioplasty procedures using our CUSA method. The indication was claudication in 6 (46%) and critical limb ischemia in 7 (54%) limbs. Technical success was achieved in 100% of the cases and all patients showed symptom improvements. One case had an intraoperative complication of arterial wall perforation and another had a wound infection requiring reintervention. All treated lesions were found to be patent at a mean postoperative period of 6 months (range 1-13 months).

CONCLUSIONS: Decalcification utilizing CUSA for a heavily calcified femoral artery was shown to be safe and efficient, with minimal adverse events encountered. There are a number of advantages with this procedure, including no need for tacking sutures, allowing for a secured suture for vein patch angioplasty and elimination of the risk of aneurysmal dilation by preserving the medial layer. Nevertheless, long-term follow-up examinations are warranted.

Figure 1. Representative findings. A. Extensive calcification in the CFA is evident. B. A CFA following decalcification using CUSA with vein patch angioplasty. The vessel lumen was fully restored, while the medial calcified layer remained preserved.



9:30 am – 10:00 am

Refreshment Break With Educational Exhibitors

§ = Best Trainee Paper Award

10:00 am – 11:50 am

SCIENTIFIC SESSION II

Presiding: Larry W. Kraiss, MD & David A. Rigberg, MD

10:00 am – 10:20 am

7.

Physician Modified Endovascular Grafts for Treatment of Juxtarenal Aortic Aneurysms: Midterm Results From An Investigator-Initiated Investigational Device Exemption (IDE) Clinical Trial

Benjamin W. Starnes, Rachel E. Heneghan, Billi Tatum—University of Washington, Seattle, WA

Discussant: Brian G. DeRubertis, MD, Los Angeles, CA

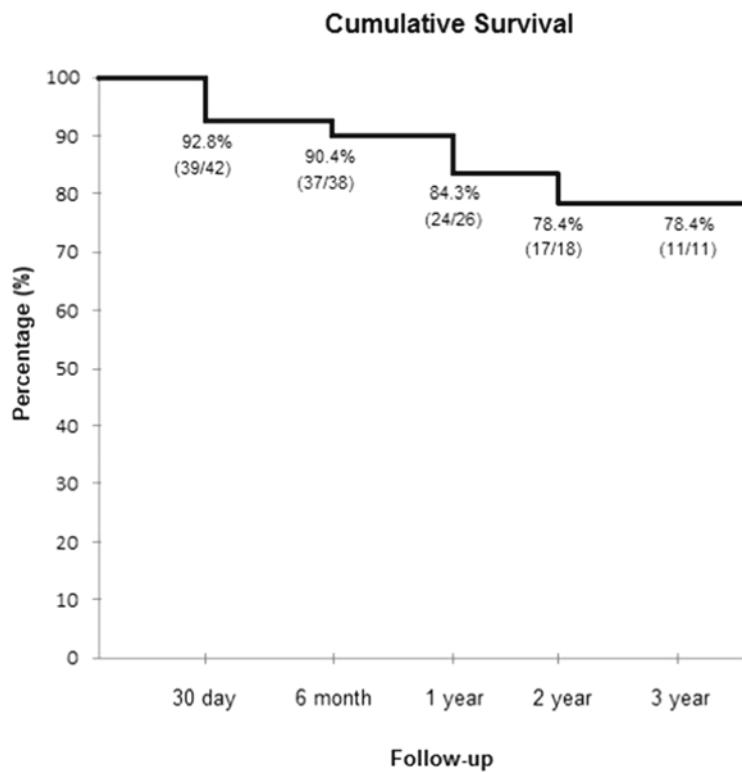
OBJECTIVE: To determine if a physician-modified endovascular graft (PMEG) is a safe and effective method for treating patients with juxtarenal aortic aneurysms who are deemed unsuitable for open repair.

METHODS: A non-randomized, prospective, consecutively enrolling IDE clinical trial was used. Data collection began in April 2011 and data-lock occurred on December 1, 2014. The primary safety and primary efficacy endpoints were used to measure treatment success.

RESULTS: During the 44-month study period, 56 patients were enrolled and 49 patients underwent PMEG. Aneurysm anatomy, operative details, and length of stay were recorded and included aneurysm diameter (mean 64.5mm, range 49-94mm), proximal neck length (mean 40.8mm, range 18.9-72.2mm), graft manufacture time (mean 56.5 minutes), procedure time (mean 165.5 minutes), fluoroscopy time (mean 41.8 min), and length of hospital stay (mean 4 days). There were 122 fenestrations made for 91 renal arteries and 31 superior mesenteric arteries (SMA). One patient had an SMA stent placed, and renal arteries were stented whenever possible (91%). There were no open conversions or explants. There were no unanticipated adverse events. Thirty-day mortality was 6.1% (3/49). Table 1 shows cumulative survival over time. The primary efficacy endpoint was achieved in 91.8 % of patients (91.8 % technical success, freedom from migration, rupture, or conversion, type I or III endoleaks, or sac enlargement = 100%, 100%, 100%, 93.8%, 100%).

CONCLUSIONS: These midterm results are favorable and continue to verify our early report that endovascular repair with PMEG is safe and effective for managing patients with juxtarenal aortic aneurysms. PMEG has acceptable midterm rates of morbidity, mortality, and endoleak. In patients who are poor open surgical candidates who present with symptomatic or ruptured aneurysms, PMEG continues to be an extremely appealing option as reliable off-the-shelf solutions are not widely available.

Table 1. Cumulative Survival.



10:20 am – 10:40 am

8.

Natural History and Risk Factors for Rupture of Thoracic Aortic Arch Aneurysms

Rachel S. Yiu, Stephen W.K. Cheng—University of Hong Kong, Hong Kong, China

Discussant: John S. Lane, III, MD, La Jolla, CA

SUNDAY

OBJECTIVES: The management of degenerative aneurysms of the aortic arch requires careful patient selection taking into consideration of risk of rupture and operative risks, and is more relevant with the emergence of hybrid and total endovascular options. The natural history of true arch aneurysms has not been previously studied. We aimed to determine the expansion rate of thoracic aortic arch aneurysm and to identify predictors for rupture.

METHODS: Consecutive patients with known true thoracic aortic arch aneurysms monitored with serial computed tomography from 2000 to 2014 were retrospectively reviewed. Thoraco-abdominal aneurysms and aneurysms due to aortic dissection and connective tissue diseases were excluded. Variables studied included patient demographics, aneurysm morphology and ascending aorta diameter. A size expansion curve for each patient was plotted with serial CT scan data and the slope obtained by linear interpolation was taken as the expansion rate. Multiple logistic regression analysis was performed to identify independent predictors of rupture.

RESULTS: A total of 45 arch aneurysms were followed up for a mean of 36.6 months (3-104). Aneurysm growth was largely linear, with an average rate of 2.5 mm/year (0-16). During follow up, nine aneurysms ruptured (20%) (Figure 1), whereas 14 patients (31%) died of other causes. Aneurysms expanding at >5.5mm/year have a 67% likelihood of rupture compared to 8.3% with <5.5mm/year (OR=24, p=0.001). An initial aneurysm size >6.5cm and hyperlipidemia were positively correlated with fast expansion (OR=13.8, p=0.004). On univariate analysis, only aneurysm size and expansion rates were significant predictors of rupture (Table 1). On multivariate analysis aneurysm growth rate was the sole independent risk factor of aneurysm rupture (OR: 1.56; 95%CI:1.02-2.38; p=.041).

CONCLUSIONS: Aneurysm expansion rate >5.5mm/year is a significant rupture predictor in addition to size, compared to aneurysm morphology and other demographic factors. Aneurysm size >6.5mm and hyperlipidemia are determining factors for expansion rate. This may have implications in patient selection for surgery. Better control of hyperlipidemia may alleviate the risk of rupture.

Figure 1. 45 Individual Aneurysm Expansion Rate Plots

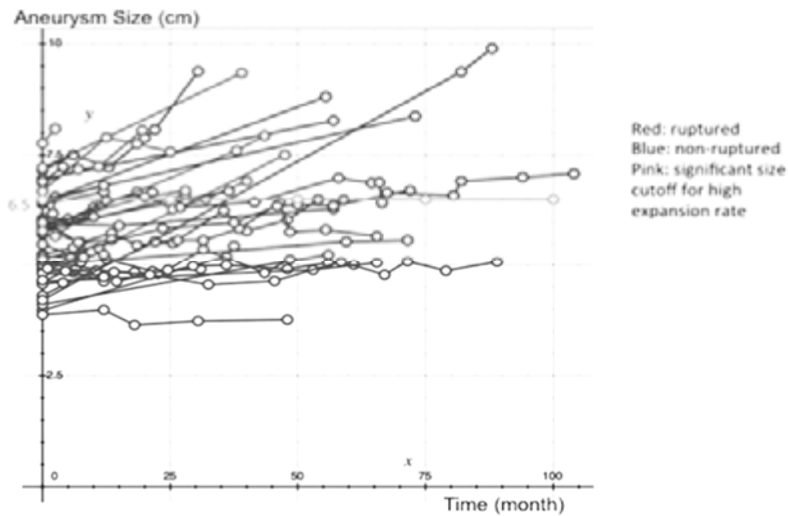


Table 1. Simple and Multiple Logistic Regression Analyses: Predictors for Aneurysm Rupture

Simple Logistic Analysis			
Predictor	OR	95% CI	p Value
Age	1.04	0.92-1.17	0.539
Male	0.84	0.14-4.98	0.852
Current smoker	0.33	0.04-2.94	0.317
Hypertension	1.54	0.27-8.64	0.624
Hyperlipidemia	0.96	0.20-4.52	0.957
Chronic heart diseases	1.43	0.31-6.64	0.649
COPD	1.30	0.27-6.22	0.743
Chronic renal diseases	1.30	0.27-6.22	0.743
Diabetes mellitus	2.08	0.46-9.35	0.340
Size	1.95	1.12-3.39	0.018 [*]
Expansion rate	1.64	1.16-2.31	0.005 [*]
Saccular morphology	1.40	0.32-6.07	0.655
Ascending Aorta Diameter	1.13	0.33-3.83	0.841
Multiple Logistic Analysis			
Predictor	OR	95% CI	p Value
Size	1.17	0.51-2.65	0.710
Expansion rate	1.56	1.02-2.38	0.041 [*]

^{*}p<0.05
 OR = odds ratio
 95% CI= 95% confidence interval

10:40 am – 11:00 am

9.

**Institutional Quality Outcome Measures:
Investigating the Impact of Raising the Positive
D-Dimer Threshold for DVT As Confirmed By
Duplex Ultrasound**

Tazo Inui, Kelley D. Hodgkiss-Harlow, Kimberly Betti—Kaiser Permanente San Diego, San Diego, CA

Discussant: York N. Hsiang, MB, MHSc, Vancouver, BC, Canada

SUNDAY

OBJECTIVES: Prior randomized controlled trials have shown that selective D-dimer testing for DVT is a safe strategy. The aim of our study is to investigate if raising our positive D-Dimer threshold from 500 to 700ng mL is efficacious in reducing unnecessary duplex testing while preserving acceptable sensitivity (currently 98%).

METHODS: It is customary for our ER/urgent care triage nurse to order a D-dimer for any suspected DVT based on patient complaint of lower limb symptoms. Otherwise Well's criteria are used during the physicians clinical examination to order a venous duplex directly. A retrospective chart review of all patients who tested positive for D-dimer (and therefore subsequently received a venous duplex ultrasound) from March 2012-February 2015 was performed (4619 pts). After assessing for positive DVT on duplex scan (including calf vein imaging), and further stratifying into two categories of positivity of D-Dimer threshold (500-700ng mL and >700ng mL), we then compared for sensitivity of each category as it pertained to DVT. Cost of venous duplex study was calculated to be on average \$250.

RESULTS: Of 4619 duplex venous studies performed for a positive D-Dimer (>500ng mL), an abnormal duplex scan was found in 585. Disease prevalence is 12.6%. An analysis of DVT presence in the lower limbs based on d-dimer levels after raising the positivity threshold to >700ng mL resulted in a sensitivity of 95.6% (CI 94.6-97), a positive predictive value of 16% and a negative predictive value of 98%. In the 26 patients with a D-dimer between 500-700ng mL, 22 involved calf veins only, and only 4 involving popliteal/femoral veins. Incidence of DVT in patients who have a D-dimer value in the 500-700ng mL category is 2%, with incidence of proximal DVT of 0.35%.

CONCLUSIONS: Based on these results, we recommend searching for causes other than DVT for the initial triage patient complaint of leg swelling or pain. Using this new protocol, we can safely raise the threshold to 700ng mL with minimal detriment to patient care, and an estimated savings of approximately \$70,000 per year to the hospital with a reduction of duplex testing by 24%.

11:00 am – 11:20 am

10.

Midterm Results of the Use of Low Profile Multibranched Thoracoabdominal Aortic Stent Grafts

Bala Ramanan, Charlene C. Fernandez, Julia D. Sobel, Warren J. Gasper, Shant M. Vartanian, Linda M. Reilly, Timothy A. M. Chuter, Jade S. Hiramoto—University of California San Francisco, San Francisco, CA

Discussant: Omid Jazaeri, MD, Denver, CO

OBJECTIVE: The purpose of this study is to compare the mid-term results using low profile stent grafts (LPSG, 18 Fr) and standard profile stent grafts (SPSG, 22-24 Fr) for endovascular pararenal and thoracoabdominal aortic aneurysm (TAAA) repair.

METHODS: From 7/2005 to 03/2015, 134 asymptomatic patients underwent endovascular repair of a pararenal or TAAA using multibranched aortic stent grafts. In 3/2011, we started using a LPSG with nitinol stents and thin-walled Dacron. Prospectively collected data on operative repair, complications, and outcomes were compared between the two groups.

RESULTS: LPSGs were used in 37 patients [mean age +SD: 72.5 + 8.1 years, 8(21.6%) females] and SPSGs in 97 patients [mean age +SD: 72.8 + 8.1 years, 25(25.8%) females]. There were no significant differences in aneurysm-related death, rupture, conversion to open repair, renal failure, stroke, paraplegia, stent graft migration, type I or III endoleaks, aneurysm enlargement >5mm, perioperative death or operative time between the two groups (Table I). There were also no significant differences in myocardial infarction, branch vessel occlusion, and re-intervention rate between the two groups ($p>0.05$). However, the combined outcome of conduit use or access artery injury occurred at a lower rate in the LPSG group than in the SPSG group (16% vs 36%, $p=0.03$). Women experienced significantly higher rates of both conduit use and access artery injury than men following repair with SPSG, but similar rates following repair with LPSG (Table II).

CONCLUSIONS: LPSG had similar safety profile and mid-term outcomes compared to the SPSG for treatment of pararenal and TAAA. The substitution of LPSG for SPSG lowers the number of patients who require conduit insertion to avoid access artery injury, especially in women, thereby reducing an otherwise striking gender difference.

Table 1. Comparison of outcomes using LPSG and SPSG.

Outcome variables	SPSG (N=97)	LPSG (N=37)	p-value
Aneurysm-related death	9 (9.3%)	3 (8.1%)	0.83
Rupture	1 (1.0%)	1 (2.7%)	0.48
Conversion to open repair	1 (1.0%)	0 (0%)	0.53
Renal failure	9 (9.3%)	4 (10.8%)	0.79
Stroke	2 (2.1%)	1 (2.7%)	0.82
Paraplegia	4 (4.1%)	2 (5.4%)	0.75
Stent graft migration	1 (1.0%)	0 (0%)	0.53
Type I or III endoleaks	10 (10.3%)	1 (2.7%)	0.15
Aneurysm enlargement >5mm	6 (6.2%)	1 (2.7%)	0.42
Perioperative death	4 (4.1%)	1 (2.7%)	0.7
Operative time: Mean +/-SD (min)	502 +/- 144	510 +/- 103	0.73

Table 2. Comparison of conduit use and access artery injury by gender and device profile.

SPSG (N=97)	Female (N=25)	Male (N=72)	p-value
Iliac conduit (N=26)	12 (48%)	14 (19.4%)	0.005
Access Artery Injury (N=11)	6 (24%)	5 (6.9%)	0.02
Iliac conduit or Access Artery Injury (N=35)[2 patients had both a conduit and an access artery injury]	16 (64.0%)	19 (26.4%)	0.001
LPSG (N=37)	Female (N=8)	Male (N=29)	
Iliac conduit (N=4)	1 (12.5%)	3 (10.3%)	0.86
Access Artery Injury (N=2)	1 (12.5%)	1 (3.5%)	0.32
Iliac conduit or Access Artery Injury (N=6)	2 (25%)	4 (13.8%)	0.45

11:20 am – 11:30 am

11.

Closure of Retrograde Popliteal Artery Access Site With A Nitinol Clip Applier Device

Owen Palmer¹, Steven Katz², Fred Weaver², William Lee²—¹University of Southern California, South Pasadena, CA; ²University of Southern California, Los Angeles, CA

OBJECTIVE: Retrograde transpopliteal artery access is a useful approach in the treatment of superficial femoral artery lesions that have previously failed an antegrade approach or that are difficult to access due hostile aortic bifurcation anatomy. The aim of this study is to review our experience with the use of a nitinol clip closure device for retrograde popliteal artery access.

METHODS: All patients who underwent retrograde popliteal artery access closed with a nitinol clip closure device from 6/1/2011 through 12/31/2014 at a single institution were retrospectively reviewed. With the patient in prone position, mid-popliteal access was obtained under fluoroscopic and ultrasound guidance with a micropuncture access system. After completion angiogram was obtained, the nitinol clip closure device was deployed.

RESULTS: During the study period retrograde popliteal artery access was obtained in 17 peripheral endovascular intervention cases in 13 patients with a mean age of 74.2. The indication for intervention was severe claudication in 14 and critical limb ischemia in 3. The rationale for retrograde popliteal access included: prior EVAR (n=2), prior kissing iliac stents (n=3), hostile bifurcation (n=3), failed antegrade approach (n=3), flush occlusion of the SFA orifice (n=6). The sheath size used in the popliteal access site was 5Fr (n=1), 6Fr (n=15) or 7Fr (n=1). In 6 cases, a re-entry device was deployed via the popliteal access site. Balloon angioplasty and stent were performed in 15 of the 17 cases. Completion angiography prior to closure showed preservation of outflow vessels. No access site hematomas developed after deployment of the nitinol clip closure device. Fourteen of the cases were done on an outpatient basis, all of which were discharged the same day with no re-admissions. Post-intervention duplex was available in 9 cases and demonstrated patent distal run-off consistent with the completion angiogram in all 9 cases. No evidence of access site stenosis has been detected in any case.

CONCLUSIONS: Retrograde transpopliteal artery access allows for delivery of endovascular treatment and can be safely closed with a nitinol clip closure device with minimal risk of hematoma, stenosis or loss of distal run-off. This technique allows for rapid return to activity and outpatient discharge.

11:30 am – 11:40 am

12.

Suture Aneurysmorrhaphy for Salvage of Bleeding Arteriovenous Fistula Aneurysms

Bian Wu, Warren J. Gasper, Charles M. Eichler, Joseph H. Rapp, Christopher D. Owens, Michael S. Conte, Shant M. Vartanian—University of California, San Francisco, San Francisco, CA

SUNDAY

OBJECTIVE: Aneurysmal changes are common in long standing arteriovenous fistulas (AVFs). Although typically asymptomatic, aneurysmal segments can ulcerate through the skin and produce life-threatening hemorrhage and infectious complications. We report a technique of suture aneurysmorrhaphy involving minimal manipulation of the fistula that can be used in the setting of infection and allows for both immediate and continued use of the fistula.

METHODS: This is a retrospective case series of suture aneurysmorrhaphy performed at a single institution between 2012 and 2015. Our technique involves resection of the anterior wall of the aneurysm with the overlying skin followed by an aneurysmorrhaphy using the back wall of the fistula over a 16f bougie. Dialysis access is preserved proximal and distal to the repair, avoiding the need for a bridging central catheter.

RESULTS: Sixteen cases were reviewed, with an average post-op follow-up of 10.6 months (IQR 4-16 mo). Mean patient age was 57 years (range 41-83 y) and mean duration of dialysis dependence 6.4 years (range 3-15 y). The aneurysmal fistula was on average 5.1 years old and most commonly transposed basilic vein (44%). Indication for intervention was skin ulceration in 9/16 patients (56%), active hemorrhage in 6/16 (38%) and patient preference in 1/16 (6%). Four patients (25%) also presented with active infection involving the aneurysmal segment (infected hematoma with bacteremia [2/16], cellulitis with fever [2/16]). Fifteen of the 16 patients (94%) were dialyzed immediately through the fistula and thus did not require a bridging central catheter. Thirteen patients (81%) have continued to use their fistulas without need for reintervention of the treated segment. Kaplan-Meier curves are provided for primary and primary-assisted patency [Fig 1 and 2]. All interventions contributing to primary-assisted patency were angioplasties for central stenosis, remote from the site of aneurysmorrhaphy. On follow up, there have been no recurrent ulcerations or aneurysmal formation.

CONCLUSIONS: We report a straightforward and effective technique to salvage aneurysmal AVFs. Our technique allows for salvage of bleeding fistulas without need for a bridging central catheter, can be used in the setting of infection and appears to have acceptable mid-term results.

Figure 1. Primary Patency

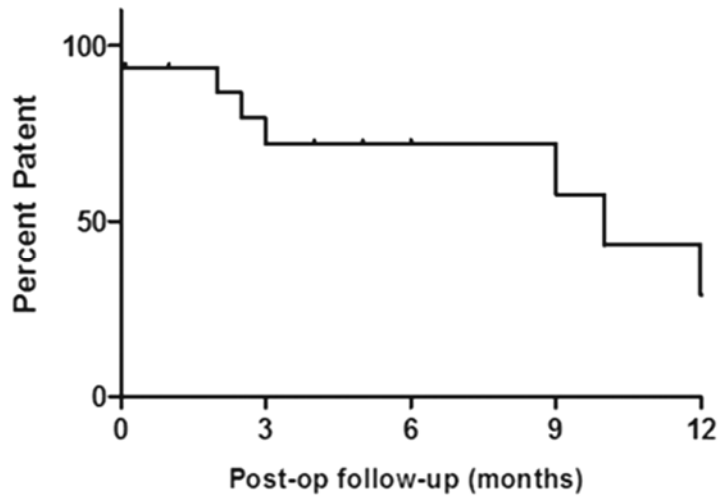
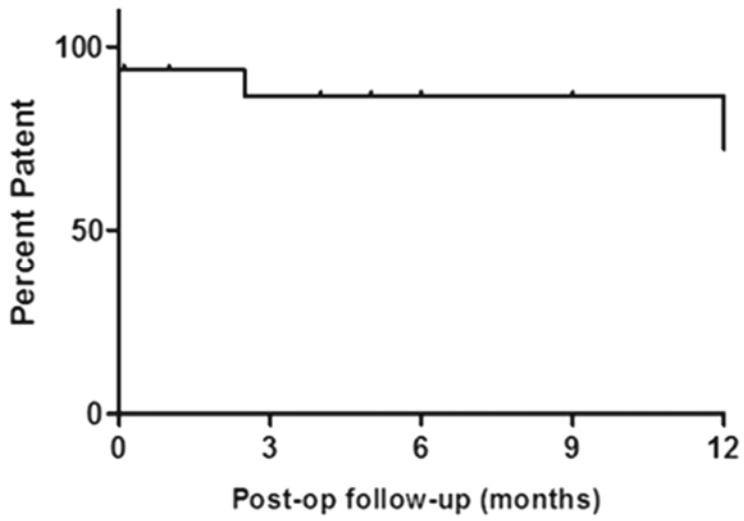


Figure 2. Primary-Assisted Patency



11:40 am – 11:50 am

13.

Radial Artery Access for Peripheral Endovascular Procedures

Sam S. Ahn¹, Avnee J. Kumar², Michele N. Moe²,
Julia F. Chen²—¹University Vascular Group, DFW
Vascular Group, Los Angeles, CA; ²UTSW, Dallas,
TX

SUNDAY

OBJECTIVE: The radial artery is often used for coronary angiography, with demonstrated decrease in local complications and an increase in post-operative patient mobility. However, data on radial artery access for peripheral endovascular procedures are limited. We describe herein our experience with radial artery access for diagnostic and endovascular interventions.

METHODS: Between February 2012 and March 2015, 97 procedures requiring radial artery access were performed on 82 unique patients. Demographic and clinical data were recorded. Peri-operative, post-operative, and 30-day follow-up data were evaluated for minor complications including superficial bleeding and hematoma and major adverse events including any immediate hospitalization, admission within 30 days, stroke, hand amputation, bleeding requiring transfusion, hematoma requiring surgery, or death.

RESULTS: The mean age of all patients was 72.1 years, with 57.3% men. Radial artery access was used for diagnostic purposes in 16.5% of all procedures and for therapeutic intervention including angioplasty and stenting in 83.5%. The radial artery was the primary access point in 91.4% of patients, and percutaneous access was achieved in 100% of patients with 100% technical success rate. Hemostasis after catheterization was achieved by TR band (75.3%) and manual compression (21.6%); data was unavailable for 3.1%. Major adverse outcomes, including celiac artery perforation and stent migration, occurred in 3.1% of cases and were not related to radial artery access. Radial artery access site-related complications occurred in 3 patients (3.1%), all of which were minor hematomas that required no treatment. The risk of radial artery complication was not associated with procedure type, vessels treated, or the use of heparin. The incidence of stroke, hand ischemia, upper extremity limb or finger loss was 0%.

CONCLUSIONS: Radial artery access for peripheral endovascular procedures appears to be safe and effective and should be considered more often. Complication rates are lower than that reported for brachial and femoral artery access.

1:00 pm – 4:00 pm	COMBINED WVS/AUSTRALIA AND NEW ZEALAND SOCIETY FOR VASCULAR SURGERY Trainee Simulation Skills Symposium Welcome & Introductions Robert Fitridge, MD, Jason T. Lee, MD, Irwin Mohan, MD & David A. Rigberg, MD
1:05 pm – 1:45 pm	STATION 1—Open AAA Simulation
1:50 pm – 2:20 pm	STATION 2—Open Carotid and Fem-Pop Simulation Break
2:35 pm – 3:15 pm	STATION 3—TEVAR Simulation
3:20 pm – 4:00 pm	STATION 4—EVAR and Ruptured EVAR Simulation
4:00 pm – 5:30 pm	COMBINED WVS/ANZSVS TRAINEES RECEPTION/PANEL DISCUSSION
4:30 pm – 5:00 pm	FELLOW LUMINARIES SESSION Maximizing Job Opportunities Transitioning From Academics To Group Practice Kai Johansen, MD Private Practice Realities Willis Wagner, MD Working for Kaiser Kelly Hodgkiss-Harlow, MD Who Should Go Into Academics Larry A. Kraiss, MD Panel Discussion and Interaction With ANZSVS
6:00 pm – 10:00 pm	WVS EVENT A Hawaiian Evening (Reception, Dinner & Entertainment) <i>Dress Code: Island casual—event is outdoors.</i>

MONDAY, SEPTEMBER 21, 2015

- 7:30 am – 8:00 am **Continental Breakfast With Educational Exhibitors**
- 8:00 am – 9:30 am** **SCIENTIFIC SESSION III**
Presiding: William C. Pevec, MD & Niten Singh, MD
- 8:00 am – 8:20 am 14.
Ascending Aortic Endovascular Repair (AA EVR) – Results of FDA Approved PS-IDE Feasibility Study
Rodney A. White, Carlos E. Donayre, Irwin Walot, Matthew Koopmann, George E. Kopchok, Ali Khoynzhad—Harbor-UCLA Medical Center, Torrance, CA/Cedars Sinai Medical Center, Los Angeles, CA
- Discussant: Timothy A. M. Chuter, MD, San Francisco, CA*

MONDAY

OBJECTIVES: Endovascular treatment of ascending aortic lesions has been reported, but no FDA approved studies have been conducted to define the use of endografts in this particular location or analyze the critical factors involved.

METHODS: Patients were consented for entry into an FDA approved Physician Sponsored IDE (PD-IDE) study to investigate the outcome of patient with ascending aortic pathologies, who were suitable for endovascular repair with a Valiant Captivia thoracic stent-graft specifically designed for deployment in the ascending aorta. Anatomic criteria required proximal and distal landing zones to be at least one cm in length, a diameter between 28-44 mm, and be classified as high-risk with an ASA IV grade. All patients had sequential gated-cardiac CT scans, with data being entered into the VQI Complex TEVAR software. All procedures were performed hybrid Room, with the capability to convert to an open repair to ensure maximal patient protection. The first five patients constituted the feasibility study, with continued enrollment based on initial results and submission of an annual report to the FDA.

RESULTS: Eighteen patients were screened, with 6 patients being entered into the PS-IDE with mean follow-up of 12 mo. (3-18 mo). There were no peri-procedural or 30-day mortalities, and one late death. All patients had sequential CTs and cardiac echocardiograms with no evidence of migration, only one endoleak, and regression of the aortic lesions in the treated aortic segment. One patient withdrew from the study after 6 months.

CONCLUSIONS: Preliminary evaluation of endovascular treatment for ascending aortic pathologies demonstrates uniform accuracy of deployment and secure fixation up to one-year. There is positive remodeling of the excluded aortic segment as has been observed in the descending aorta. Due to the severe aortic/cardiac angle encountered in some patients, approval to utilize transapical access for device deployment has been granted by the FDA.

8:20 am – 8:40 am

15.

Does Metformin Suppress Aneurysmal Aortic Degeneration?

Ronald L. Dalman, Baohui Xu, Ellen Kettler, Jiang Xiong, Naoki Fujimura, Haojuan Xuan, Keith J. Glover, Sara A. Michie, Matthew W. Mell—
Stanford University School of Medicine, Stanford, CA

Discussant: Roy M. Fujitani, MD, Orange, CA

OBJECTIVE: Diabetes mellitus is a significant risk factor for arterial occlusive disease in many circulatory beds. Paradoxically, risk for abdominal aortic aneurysm (AAA) disease is reduced in diabetic patients and, in patients with established AAA, diabetes is associated with reduced rates of aneurysm enlargement. The specific influences of hyperglycemia or its treatment on aneurysm pathogenesis remain poorly understood. We investigated the possibility that metformin, the most widely prescribed oral-hypoglycemic agent worldwide, may independently limit AAA progression.

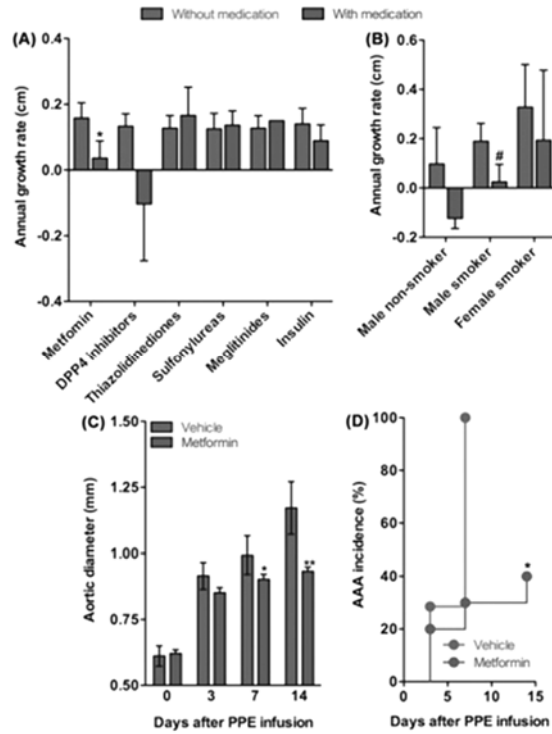
METHODS: Following IRB approval, a health care system-wide database was retrospectively queried to identify diabetic AAA patients with at least two serial aortic diameter measurements prior to surgical repair. In this cohort, time-dependent aortic diameter enlargement was analyzed as a function of medication regimen. In parallel experiments, murine AAA models were created to assess the influence of metformin on aneurysm progression, using serial in-vivo aortic diameter assessment during treatment and histological analysis at sacrifice.

RESULTS: Sixty five diabetic AAA patients were identified as having at least two serial cross-sectional imaging studies spanning a period of at least six months. Average follow-up was 2.4 +/- 2.1 years. When controlled for smoking status and gender, analyzed as a function of statin, angiotensin inhibition, alpha/beta or calcium channel blocker status, insulin and oral hypoglycemic use, only metformin (Figs. A & B) was negatively associated with aneurysm progression. In the mouse experiments, treatment with metformin dramatically suppressed the incidence and progression experimental aneurysms (Figs. C & D). Histologically, metformin treatment preserved medial elastin content and smooth muscle cellularity, while reducing the density of aortic mural macrophages, CD8 T cells and neovessels (data not shown).

CONCLUSIONS: Metformin use may influence AAA progression. The negative association of diabetes mellitus with AAA prevalence and progression, confirmed in epidemiologic studies worldwide, may not be due to the consequences of hyperglycemia or insulin resistance alone.

MONDAY

Figure 1. Influence of metformin on aneurysm progression. (A) Influence of various diabetic medication on aneurysm expansion in diabetic patients. (B) Influence of metformin therapy on aneurysm growth in diabetic patients after stratifying for gender and smoking status. (C, D) AAAs were created in 10 week old male C57BL/6J mice via intra-aortic infusion or porcine pancreatic elastase (PPE). These mice were daily treated with metformin (250 mg/kg) (n=10) or vehicle (saline) (n=7) beginning day 3 prior to AAA creation. Aneurysms were followed up via serial ultrasound measurements of infrarenal aortic diameters. Metformin treatment reduced PPE infusion-induced aortic aneurysm progression (C) and incidence (D) in mice as compared to vehicle treatment. An AAA was defined as a more than 50% diameter increase over baseline level. All data in A, B and C are mean and SEM. *P<0.05 and **P<0.01 compared to vehicle (C, D) or without medication (A). #P=0.083 compared to without medication (B).



8:40 am – 9:00 am.

16.

Drivers of Readmissions in Vascular Surgery Patients

Natalia O. Glebova¹, Michael Bronsert¹, Karl E. Hammermeister¹, Mark R. Nehler¹, James H. Black, III², William G. Henderson¹—¹University of Colorado Denver, Aurora, CO; ²Johns Hopkins Hospital, Baltimore, MD

Discussant: Shant M. Vanatanian, MD, San Francisco, CA

OBJECTIVE: Readmissions are frequent in vascular surgery patients, but it is not clear which factors are the drivers of readmissions. Specifically, the relative contributions of patient comorbidities versus postoperative complications are unknown. We sought to study the potential drivers of readmission and create a model for predicting the risk of readmission in vascular patients.

METHODS: The 2012-2013 American College of Surgeons National Quality Improvement Program dataset was queried for unplanned readmissions in vascular patients. Bivariable and multivariable risk adjustment analyses were used to model the relative contributions of patient comorbidities, operative factors, and postoperative complications for readmission.

RESULTS: The unplanned readmission rate was 9.3%. The preoperative model based on patient comorbidities predicted readmission risk with a low c-index of 0.666; the top 5 predictors were American Society of Anesthesiologists class, preoperative open wound, inpatient operation, dialysis dependence, and diabetes mellitus. The postoperative model that included postoperative complications predicted readmission risk better (c-index 0.778); postoperative complications were the most significant predictor of readmission, overpowering patient comorbidities. Importantly, postoperative complications identified prior to discharge from the hospital were not a strong predictor of readmission, as the model using pre-discharge postoperative complications had a similar c-index to our preoperative model (0.681). However, the inclusion of complications identified after discharge appreciably improved the predictive power of the model (c-index 0.778). The top 5 predictors of readmission in the final model based on comorbidities and postoperative complications were post-discharge deep space infection, superficial wound infection, pneumonia, myocardial infection, and sepsis.

MONDAY

CONCLUSIONS: Readmissions in vascular surgery patients are mainly driven by postoperative complications identified after discharge. Thus, efforts to reduce vascular readmissions based on inpatient data may prove ineffective. Our study suggests interventions to reduce vascular readmissions should focus on prompt identification of modifiable postdischarge complications.

9:00 – 9:10 am

17.

Endovascular Management of Intraoperative Iliocaval Injuries With Commercially Available Endografts

Venita Chandra, Chelsea Dorsey, Benjamin Colvard, Jason T. Lee—Stanford University, Stanford, CA

OBJECTIVE: Intraoperative injury to the inferior vena cava or iliac vessels represents a surgical challenge that carries high morbidity and mortality. Repair of such injuries with conventional open surgical techniques are notoriously difficult and can be associated with substantial hemorrhage. Endovascular approaches can minimize the amount of dissection and mobilization necessary for repair and may be an attractive alternative. We report three cases of intraoperative iliocaval injuries which were successfully treated by endovascular exclusion.

METHODS: Patient 1 was a 50 year old man with metastatic pancreatic cancer who experienced an injury to his infra-hepatic vena cava (IVC) during debridement of a flank wound. Patient 2 was a 72 year old man with adrenal carcinoma who sustained injury to the IVC during radical nephrectomy. The final patient (3) was a 61 year old woman who sustained an ilio-caval injury during anterior exposure for a spinal fusion.

RESULTS: All three patients presented as emergency cases due to life threatening intraoperative hemorrhage. For patient 1, hemorrhage control was initially unsuccessfully attempted with balloon occlusion proximal and distal to the injury. Proximal cuff endografts were then placed (32 mm width) but did not control the bleeding. Ultimately a 32x100 thoracic endograft controlled the hemorrhage. Patient 2 underwent successful control of bleeding after placement of a 31 x100 thoracic endograft Patient 3 had control of hemorrhage by placement of a 32 and 28 mm proximal cuff in the distal IVC followed by deployment of a 16x14.5x7cm limb into the left common iliac vein (Figure). All endografts remained patent in the immediate post-operative period (mean follow-up 3 months), without any further hemorrhage or other stent related complications.

CONCLUSIONS: Endovascular stent graft exclusion of massive hemorrhage due to ilio-caval injuries can be a potentially life-saving alternative to open repair. Large caliber devices are usually necessary due to the caliber and compliance of the vessels. Balloon molding should be limited and used with caution.

MONDAY

Figure 1.



9:10 am – 9:20 am

18.

A Comparative Analysis of the Influence of Stent Graft Design On Long-Term Outcomes After Endovascular Abdominal Aortic Aneurysm Repair

Neha Sheng, Ahmed M. Abou-Zamzam, Jr., Jason T. Chiriano, Phong T. Dargon, Theodore H. Teruya, Christian Bianchi—Loma Linda University Medical Center, Loma Linda, CA

BACKGROUND: The purpose of our study is to report on behavior of the aortic aneurysm sac after endovascular aneurysm repair (EVAR) for infrarenal abdominal aortic aneurysm (IRAAA), comparing the results of repair with modular bifurcated as compared with unibody aortic stent grafts.

METHODS: We retrospectively reviewed a prospectively maintained database of EVAR procedures performed at a single institution, between September 2006 and October 2011. Patients were included if they underwent elective EVAR for asymptomatic IRAAA greater than 5 centimeters in diameter, and if preoperative and postoperative imaging was available for review. Patients were assessed with CT scan at 1, 6, 12 months and yearly thereafter. Aneurysm sac regression was defined as >5 millimeters (mm) of decrease in the minor axis of the aneurysm sac, between the first postoperative CT scan and the subsequent follow-up CT scan, and growth was defined as >5mm of increase in minor axis.

RESULTS: A total of 254 patients underwent EVAR during the study time period, and 187 patients met the inclusion criteria. 117 patients underwent EVAR with a modular bifurcated graft: Aneurix (n3), Gore Excluder (n97), Medtronic Talent (n11), Cook Zenith (n6). 70 underwent EVAR with the Endologix unibody design stent graft. Overall follow-up was 40.2 months. The rates of postoperative aneurysm sac regression, stability, and increase were 51.3%, 41.9%, and 6.8% in the modular bifurcated group, and 52.9%, 38.6%, and 8.6% in the unibody group (p 0.85). The unibody group had fewer type 2 endoleaks (18.6%) when compared with the modular bifurcated group (31.6%); this result approached statistical significance (p0.051). In each group, endoleak was associated with a greater rate of sac growth, while freedom from endoleak was associated with a higher rate of sac regression (p<0.001).

CONCLUSIONS: Aneurysm sac regression is associated with freedom from endoleak, and sac growth is associated with endoleak. There is no significant difference in aneurysm sac regression between modular bifurcated and unibody stent design. However, sac behavior may be indirectly related to stent graft design through the influence of endoleak. There is a trend toward fewer type 2 endoleaks after EVAR with unibody grafts. Minimizing endoleak should be the focus of future stent graft design modifications.

MONDAY

9:20 am – 9:30 am

19.

Comparison of Vascular Remodeling and Integration Between the Bioresorbable Poly-L-Lactic Acid Scaffold Stent and the Metallic Stent in Porcine Iliac Artery

Hideaki Obara, Yasuhito Sekimoto, Kentaro Matsubara, Naoki Fujimura, Yuko Kitagawa—Keio University School of Medicine, Tokyo, Japan

OBJECTIVES: Bare metal stent (BMS) and Drug-eluting stent (DES) have already been proven useful in clinical practice. As BMS and DES are all permanent implants, no procedure can remove it other than surgery. In-stent restenosis, which is luminal renarrowing at a stented segment, remains a major clinical limitation. Bioresorbable scaffolds (BRS), which degrade over time, have the potential to overcome the concerns associated with BMS and DES to improve the possibility for later additional revascularization, to reduce the risk of late stent thrombosis, and to be compatible with noninvasive imaging technologies. The aim of this study is to assess the technical feasibility and biocompatibility of the bioresorbable poly-L-lactic acid scaffold comparing with BMS in porcine iliac arteries.

METHODS: BRSs and BMSs were implanted bilaterally in iliac arteries of 5 miniature swine. Digital subtraction angiography and intravenous ultrasound (IVUS) were performed before and immediately after the stent placement and repeated prior to sacrifice at 6 weeks. In IVUS analysis, remodeling was calculated as EEL (External elastic lamina) area at 6 weeks follow-up minus EEL area at immediately after the stent placement. Late lumen loss was calculated as lumen area at immediately after the stent placement minus lumen area at 6 weeks follow-up. Stented segments were explanted and processed for quantitative histomorphometry. Vascular injury and inflammation score were assigned to the stented segments.

RESULTS: All BRSs and BMSs were patent at the end of follow-up. The vessel lumen was significantly smaller in BRS group (3.45 mm² vs. 11.9mm², $P < .001$; Table and Fig). Percentage area stenosis was similar in both groups (63.1 % vs. 58.9 %, $P = .524$). While neointimal area was significantly larger in BMS group (5.83 mm² vs. 16.9 mm², $P < .001$; Table), media area was larger in BRS group (5.08 mm² vs. 3.09 mm², $P = .002$; Table). In IVUS analysis, late lumen loss and remodeling were similar in both groups ($P = .558$ and $.882$). In histopathological analysis, there is no significant difference between two groups in vascular injury score and inflammatory score.

CONCLUSIONS: BRS and BMS have similar short-term outcomes in porcine iliac arteries. The reactions of vessel wall were different between two groups in neointimal formation and media area enlargement.

	PLLA stent	BMS	P Value
Lumen (mm ²)	3.45 (1.82-6.65)	11.9 (2.55-21.7)	0.000
IEL (mm ²)	9.28 (2.69-10.90)	28.8 (21.0-32.1)	0.000
EEL (mm ²)	14.4 (8.99-22.2)	31.8 (24.1-34.9)	0.000
Neointimal area (mm ²)	5.83 (3.12-10.97)	16.9 (7.59-28.7)	0.000
Media area (mm ²)	5.08 (2.69-10.90)	3.09 (2.44-4.25)	0.002
% area stenosis (%)	63.1 (36.5-83.2)	58.9 (26.3-91.8)	0.524

Table. Histomorphometry. Values are mean (range).
 PLLA stent, Poly-L lactic acid stent; BMS, bare-metal stent
 IEL, the area within the internal elastic lamina
 EEL, the area within the external elastic lamina

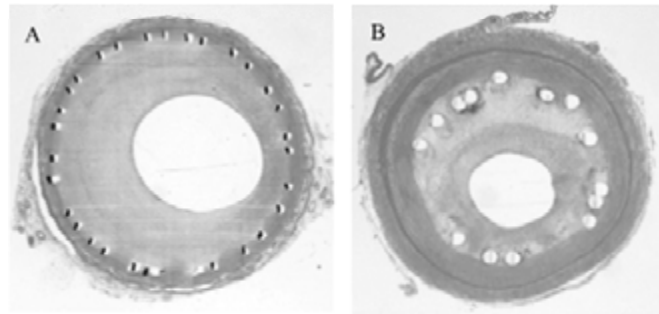


Figure. Representative photomicrographs of hematoxyline-eosine stained sections of porcine iliac arteries 6 weeks after two types of stent implantation. (A) Bare-metal stent (B) Bioresorbable PLLA stent

MONDAY

9:30 am – 10:00 am

Refreshment Break With Educational Exhibitors

10:00 am – 11:10 am **SCIENTIFIC SESSION IV**
Presiding: William C. Pevec, MD & Benjamin M. Starnes, MD

10:00 am – 10:10 am 20.
Amputation Trends for Patients With Lower Extremity Wounds Due To Diabetes and Peripheral Artery Disease
Misty Humphries, Ann Brunson, Chin-Shang Li, Joy Melnikow, Patrick Romano—University of California-Davis, Sacramento, CA

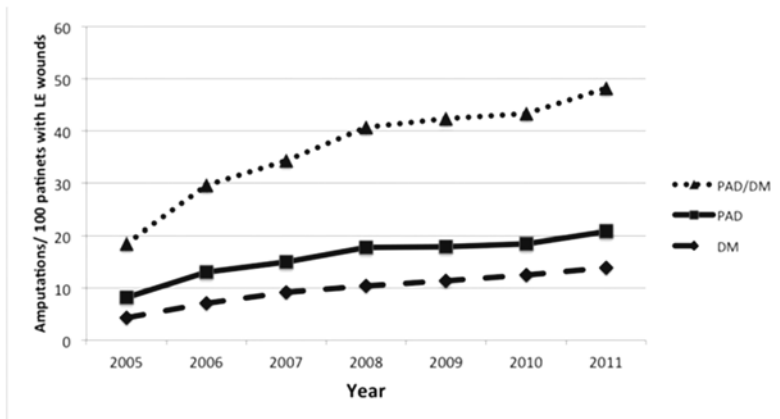
OBJECTIVE: Population based studies suggest that amputation rates for patients with diabetes mellitus (DM) are increasing while those due to peripheral arterial disease (PAD) or combination PAD/DM are decreasing. Population based studies grossly underestimate and may skew understanding of true amputation rates in risk patients.

METHODS: Using a statewide database, patients admitted to a nonfederal hospital, seen in an emergency room (ER), or treated in an ambulatory care center (ACC) within the state from 2005 through 2011 with an ICD-9-CM diagnosis code for a lower extremity (LE) ulcer with associated DM, PAD, or PAD/DM were identified. Using a unique record linkage number all subsequent hospital/ER/ACC visits and procedures are captured to identify if a patient underwent major amputation. Patient demographics and yearly amputation risk trends were analyzed.

RESULTS: 169,413 patients were identified with a LE ulcer throughout the state. Of these 104,512 were DM-associated, 27,262 PAD-associated, and 37,739 associated with both PAD/DM. From 2005-2011 there was a statistically significant ($p=0.01$) increase in the observed disease associated amputation rates for all three disease categories. (Figure) Patients were then analyzed by age, gender, race, and insurance status to determine characteristics associated with increased amputation rates. Within all age groups there was a statistically significant increase in amputation rates ($p = 0.004$), however there was no difference between the increase in amputation rates in men and women ($p=0.23$) or among racial groups ($p=0.99$). Hispanic (20/100 patients) and African Americans (18/100 patients) had the highest amputation rates. Finally, Kaplan Meier analysis showed that patients with no insurance had the highest amputation rate over the study period ($p<0.001$).

CONCLUSIONS: Preventable amputations associated with high-risk diseases are increasing despite continuing advances in care and education. This is most notable in patients without insurance. Further research to understand treatment for patients with lower extremity ulcers may shed light on pathways for amputation prevention in the future.

Figure 1. High Risk Amputation Rates



MONDAY

10:10 am –10:20 am

21.

The Use of Cryopreserved Allograft In Patients With Dialysis Access Failure and Infection

Michael Harlander-Locke¹, Peter Lawrence¹, Hugh Gelabert¹, James Kohn², Christopher Abularrage³, Michael Ricci⁴, Sotero Peralta⁵, Gary Lemmon⁶, Aamna Ali⁷, Jeffrey Hsu⁷—¹University of California Los Angeles, Los Angeles, CA; ²Doctors Hospital at White Rock Lake, Dallas, TX; ³Johns Hopkins, Baltimore, MD; ⁴Central Maine Medical Center, Lewiston, ME; ⁵Cleveland Clinic, Cleveland, OH; ⁶Indiana University, Indianapolis, IN; ⁷Kaiser Foundation Hospital, Fontana, CA

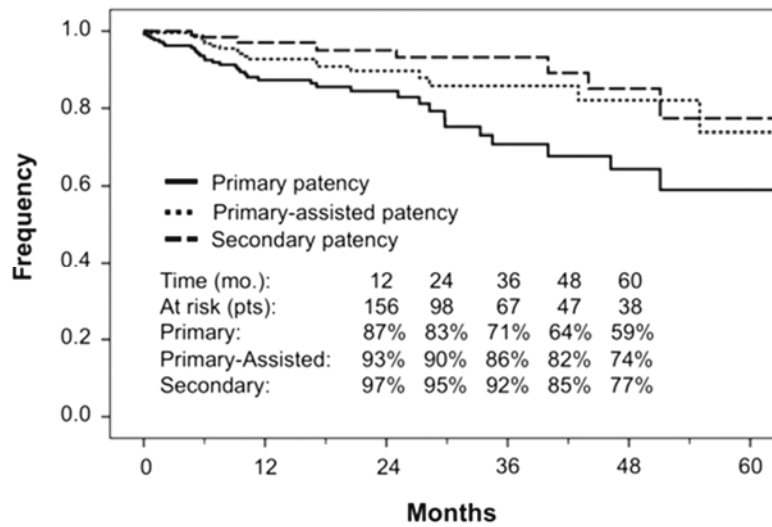
OBJECTIVE: This study examines the use of cryopreserved allograft for hemodialysis access in patients with previous or current arm infection and no autogenous conduit availability.

METHODS: Patients implanted with cryopreserved allograft for hemodialysis access were reviewed between Jan. 2004 - Jan. 2014 using a standardized, multi-institutional database. Demographic, comorbidity, procedural, and outcomes data were evaluated.

RESULTS: Two hundred and fifty-eight patients (mean age = 62) underwent placement of cryopreserved vein (n=243) or artery (n=15) for hemodialysis access. Indications for use included high risk for infection (n=143; 55%), history of infected prosthetic graft (n=72; 28%), or current infection (n=43; 17%). All patients had no autogenous veins available in the ipsilateral, and had a mean of 2.3 failed previous access grafts or fistula. Mean time from placement to first hemodialysis use was 29 days (range: 11-79 days). Local access complications included early thrombosis (n=9; 3%), late thrombosis (n=21; 8%), late infection (n=18; 7%), graft stenosis (n=12; 5%), pseudoaneurysm formation (n=6; 2%), and bleeding at graft puncture site (n=6; 2%). Hemodynamic complications included steal syndrome (n=19; 7%), and venous hypertension (n=5; 2%). Nine patients died prior to first use and 17 patients required perioperative reintervention. Overall, patients required a mean of 0.6 interventions to maintain graft patency and use (Figure 1). Mean follow-up was 23 months. Of the 258 grafts implanted, 142 patients continue using their graft after a mean of 509 days (mean allograft fee per day of graft patency < \$12.31). Grafts no longer in use had a prior mean usage of 463 days; the mean allograft fee per day of graft patency was \$13.54.

CONCLUSIONS: Cryopreserved allograft for hemodialysis access is an alternative to prosthetic graft in patients with no autogenous conduit. It may be placed in an infected arm at the time of infected graft excision, and demonstrates comparable patency to historic controls in patients who require a 2-staged excision and reimplantation.

Figure 1.



MONDAY

10:20 am – 10:30 am

22.

Post-Operative Outcomes Correlate With Frailty Defined Using Vascular Quality Initiative Data

Larry W. Kraiss, Ragheed Al-Dulaimi Julie Thelen, Benjamin S. Brooke—University of Utah, Salt Lake City, UT

OBJECTIVE: Frailty is a multifactorial condition that correlates with clinical outcomes after surgery. We hypothesized that frailty could be defined using information collected as part of the Vascular Quality Initiative (VQI) and would correlate with vascular surgery post-operative outcomes.

METHODS: 15 VQI variables were identified and then grouped into 10 categories that mapped to established characteristics in the validated Canadian Study of Health and Aging frailty index (Table). A frailty index was then calculated by scoring one point for any positive response mapping to a frailty category divided by the number of categories for which data existed (possible values of 0-1). The VQI-derived frailty index was then correlated with postoperative outcomes for 735 operations (CEA=110; EVAR=99; open AAA=39; lower extremity bypass=126; lower extremity endovascular=291; open supra-inguinal=52; TEVAR=18) entered into the VQI by a single institution from June 2010 - March 2015. Generalized estimating equations (GEE) were used to account for multiple operations in some patients.

RESULTS: Mean overall frailty score was 36.8±17.8. A frailty score > 0.3 was associated with older age, female gender, non-white race, higher ASA class, longer procedure times, more perioperative transfusions, non-ambulatory status at discharge as well as discharge to a care facility rather than home (all P<0.05). In-hospital mortality was 3% (21/735) and patients who died had a significantly higher frailty score (45.4±22.9 v 36.5±17.6; P=0.04). Using GEE models, death was associated with frailty score, higher age, non-elective indication for surgery, incoming transfer from another hospital and more perioperative transfusions (all P<0.05).

CONCLUSIONS: VQI data elements can be used to calculate a frailty score which is associated with adverse perioperative outcomes such as death, discharge to a care facility and non-ambulatory status. Further study will better define the appropriate use of the VQI-frailty score as a clinical decision-making tool.

Figure 1. VQI Variables Mapped To Frailty Categories

Frailty Category (n=10)	VQI Variable (n=15)
Hypertension	Hypertension
Congestive heart failure (CHF)	Congestive heart failure (CHF)
Myocardial infarction	*History of coronary artery disease (angina, MI) *Prior CABG/PCI *Positive cardiac stress test
Peripheral vascular disease	*Any ABI <0.7 *Prior arterial vascular operation (bypass, CEA, aneurysm repair, PVI, major amputation)
Renal impairment	*Cr > 1.78 mg/dl *Dialysis
Diabetes mellitus	Diabetes mellitus
Lung or respiratory problem	COPD
Functional dependence	*Pre-admission living (home/nursing home) *Pre-admission ambulation (ambulatory, ambulatory with assist, wheelchair, bedridden)
Other medical problem	Anemia (Hgb <13 g/dl - male; <12 g/dl - female)
Underweight	BMI < 19

MONDAY

10:30 am – 10:42 am

23.§

Blunt Aortic Injury: A Call for A New Classification System and Treatment Strategy

Rachel E. Heneghan, Shahram Aarabi, Niten Singh, Elina Quiroga, Nam Tran, Benjamin W. Starnes—
University of Washington, Seattle, WA

OBJECTIVE: The current SVS classification scheme for blunt aortic injury, while descriptive, does not guide therapy. We propose a simplified classification scheme based on our prior publication and robust experience with BAI that is descriptive and guides therapy.

METHODS: Patients presenting with blunt aortic injury from January 1999 to September 2014 were identified from our institution's trauma registry. We divided patients into the following groups; Group 1: prior to the first FDA-approved thoracic endovascular device (1999-2005); Group 2: FDA-approved TEVAR devices (2005-2010); and Group 3: FDA-approved BAI-specific devices (2010-present). Our classification scheme was the following: "minimal"-SVS Grade 1 and 2; "moderate"-SVS Grade 3 and "severe" SVS Grade 4.

RESULTS: We identified 226 patients with a diagnosis of BAI (group 1-75 patients, group 2-84 patients, and group 3-67 patients). Mean injury severity score was 39.5 (range 16-75). Table 1 details the treatment of each group by our classification scheme. BAI-related in-hospital mortality was significantly higher prior to endovascular introduction, 14.6% vs 4.8% ($p=0.03$), but was not significantly different before and after BAI-specific devices were introduced ($p=0.43$). 146 patients (64.6%) underwent operative intervention (91 patients-TEVAR and 55 patients-open repair), with the majority (94%) sustaining a grade 3 or 4 injury. Survival in groups 2 and 3 was higher versus group 1 (86.4% vs. 73.8%), but was not significant ($p=0.38$). The majority of patients (45 of 47 patients, 96%) in groups 2 and 3 with a "minimal" aortic injury (MAI) were managed non-operatively with no BAI-related deaths. After 2007, follow-up imaging was obtained in 38 (80%) patients with MAI and progression of the BAI was not observed. Twelve patients had stable appearing CT scans, 19 had complete resolution, and six had a decreasing size of injury noted.

CONCLUSION: Our experience confirms that BAI-related mortality is now 5%. We propose simplification of the SVS grading criteria of BAI into "minimal", "moderate" and "severe" based on treatment differences between the three groups. MAI can be successfully managed non-operatively without follow-up imaging. "Moderate aortic injury" can be managed semi-electively with TEVAR and "severe aortic injury," requires emergency TEVAR.

Table 1. Open, endovascular and non-operative treatment of BAI over the past 15 years by proposed BAI-injury classification system.

	Group 1 1999-3/2005	Group 2 3/2005-6/2010	Group 3 6/2010-present	Totals
Open repair	43 (57.3%)	12 (14.2%)	0	55 (24.3%)
Minimal aortic injury	3	–	–	3
Moderate aortic injury	33	10	–	43
Severe aortic injury	7	2	–	9
Endovascular repair	22 (29.3%)	33 (39.3%)	36 (53.7%)	91 (40.2%)
Minimal aortic injury	4	2	–	6
Moderate aortic injury	18	27	34	79
Severe aortic injury	–	4	2	6
Non-operative	10 (13.3%)	39 (46.4%)	31 (46.3%)	80 (35.4%)
Minimal Aortic Injury	8	23	22	53
Moderate aortic injury	2	16	9	27
Severe aortic injury	–	–	–	–
Totals	75	84	67	226
Dead	20 (26.7%)	16 (19%)	10 (14.9%)	46 (20.4%)
BAI-related death*	11 (14.6%)	4 (4.8%)	4 (6%) $p=0.13$	19 (8.4%)
Pre-and Post-TEVAR BAI related deaths	11 (14.6%)	8 (5.3%) $p=0.03$		

*All moderate or severe aortic injuries

MONDAY

10:42 am – 10:54 am

24.§

Does Gender or Use of Regional Anesthesia Have Influence on Carotid Endarterectomy Outcomes?

Michael D. Sgroi, Elizabeth L. Chou, Nii-Kabu Kabutey, Isabella J. Kuo, Roy M. Fujitani—
University of California Irvine, Orange, CA

OBJECTIVE: Carotid endarterectomy (CEA) is the most commonly performed surgical procedure to reduce risk of stroke. The operation may be performed under regional (RA) or general anesthesia (GA). Despite perceived advantages of RA, previous trials have found no difference in incidence of transient ischemic attack, stroke, myocardial infarction (MI) and death with RA compared with GA. A retrospective review was performed to determine if post-operative outcomes were influenced by gender and/or the type of anesthesia used.

METHODS: Patients who underwent CEA between 2005-2011 were extracted from the ACS NSQIP database. The cohort was separated by sex and anesthesia type. Primary endpoints included 30-day incidence of stroke and MI. Secondary endpoints included 30-day postoperative local complications, operative time and length of surgical stay.

RESULTS: Of the 41,442 CEA cases, most patients were male (24,568 M, 16,874 F) and most cases were performed under GA (85% M, 86%F). Adjusted multivariate analysis showed no statistical difference between primary endpoint outcomes based on gender or type of anesthesia used. There was, however, a trend for increased risk of 30-day post-operative local complications and 30 day incidence of MI in those operations conducted under GA compared to RA. Operative time was decreased and length of stay was increased in females, regardless of anesthesia used (mean difference -8.15 [10.09, -6.21] p <0.0001; 0.34 [0.14, 0.54] p <0.02). General anesthesia was associated with increased operative time, and increased total length of total surgical stay, regardless of sex, with statistical significance.

CONCLUSIONS: There is no significant difference in post-operative outcomes between women and men regardless of type of anesthesia used for CEA. GA was found to be associated with increased length of stay and operative time, compared with RA in women and men, suggesting that choice of anesthesia may have significant economic impact for patients and institutions. The trend of increased 30 day post-operative local complications and 30 day MI among GA cases also support the use of RA for CEA. These factors warrant further evaluation to improve patient outcomes and economic impact of this commonly performed procedure.

Table 1. Estimates of association with sex, anesthesia and their effect modification.

Variable	Adjusted OR/MD (95% CI)	Adjusted p-value
30-day Post-op local complications		
Females vs males	0.88 (0.49, 1.61)	1.0000
General vs local	1.50 (1.03, 2.18)	0.5744
Effect modification	1.29 (0.69, 2.41)	1.0000
30-day Mortality		
Females vs males	1.12 (0.56, 2.22)	1.0000
General vs local	1.00 (0.63, 1.60)	1.0000
Effect modification	0.99 (0.47, 2.07)	1.0000
30-day MI		
Females vs males	1.33 (0.60, 2.99)	1.0000
General vs local	1.94 (1.09, 3.42)	0.4173
Effect modification	0.73 (0.31, 1.69)	1.0000
30-day Stroke		
Females vs males	1.38 (0.87, 2.19)	1.0000
General vs local	0.98 (0.70, 1.37)	1.0000
Effect modification	0.94 (0.57, 1.55)	1.0000
Operative Time (min)		
Females vs males	-8.15 (-10.09, -6.21)	<0.0001
General vs local	19.46 (17.99, 20.93)	<0.0001
Effect modification	-1.86 (-4.07, 0.34)	1.0000
Length of total surgical stay		
Females vs males	0.34 (0.14, 0.54)	0.0163
General vs local	0.35 (0.23, 0.48)	<0.0001
Effect modification	-0.15 (-0.37, 0.08)	1.0000

MONDAY

10:54 am – 11:06 am

25.§

Superior Mesenteric Artery Outcomes After Fenestrated Endovascular Aortic Aneurysm Repair

Salim Lala¹, Martyn Knowles¹, David E. Timaran¹,
Mirza S. Baig¹, Rawson J. Valentine², Carlos H.
Timaran¹—¹UT Southwestern, Dallas, TX;
²Vanderbilt University, Nashville, TN

Sponsored by: Roy M. Fujitani, MD

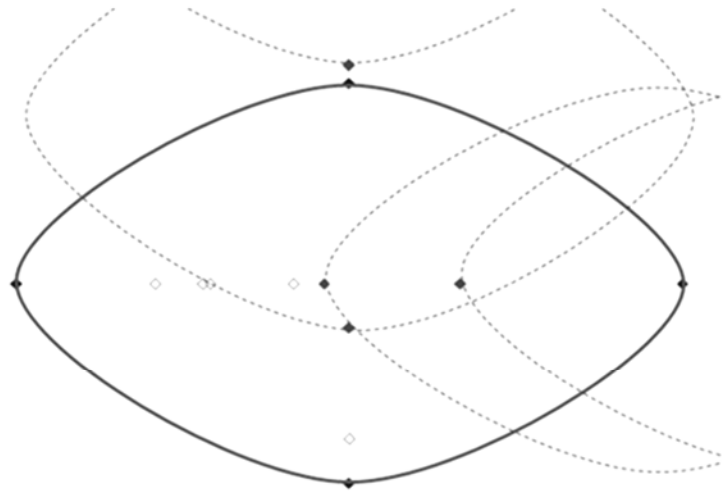
OBJECTIVE: The Zenith fenestrated endovascular graft may be designed with single wide scallops or large fenestrations to address the superior mesenteric artery (SMA). Misalignment of the SMA with an unstented scallop or large fenestration is possible. The purpose of this study was to assess SMA outcomes after fenestrated endovascular aortic aneurysm repair (FEVAR).

METHODS: Over an 18-month period, 47 FEVARs were performed at a single institution. For analysis, patients were divided in 2 groups: unstented (n=23) vs. stented (n=24) SMA scallops/fenestrations.

RESULTS: Technical success for FEVAR was 100%. The median follow-up period was 7.7 months (range, 1-16 months). In the unstented group, 9 patients (9/23; 39%) had some degree of misalignment of the SMA (range, 9%-71%) (Fig). Among these, 4 patients developed complications: 3 SMA stenoses and 1 occlusion (4/23; 17%). The mean peak systolic velocity (PSV) in patients with and without SMA misalignment was 317.8 cm/s vs. 188.4 cm/s (p<0.08), respectively. In the stented group, no misalignment occurred and only 1 patient (1/24; 4%) developed an SMA stenosis that required angioplasty. Overall, patients with unstented SMAs had significantly more adverse events directly attributable to SMA misalignment, compared to the stented group (44% vs. 7%, respectively; p<0.05).

CONCLUSIONS: Misalignment of the SMA with the use of unstented scallops or fenestrations occurs frequently. Routine stenting of single wide and large fenestrations, when feasible, may be a safer option for patients undergoing FEVAR.

Figure 1. SMA scallop misalignment relative to SMA ostia.



MONDAY

◆	Misaligned scallop strut with stenosis
◇	Misaligned scallop strut without stenosis
⋯	Misaligned scallop with stenosis
◌	SMA ostia

11:10 am – 12:00 pm **WVS Business Meeting**

12:00 pm – 12:45 pm **Lunch Break**

1:00 pm – 2:30 pm	WVS/ANZSVS SESSION I Presiding: William C. Pevec & Irwin V. Mohan
1:00 pm – 1:40 pm	DEBATE: Management of Chronic Ilio-Femoral Vein Thrombosis (Including May-Turners) With Poor Inflow: Endophlebectomy and Stenting Is the Best Modern Treatment, or Are There Better Alternatives?
1:00 pm – 1:15 pm	For, Endophlebectomy and Stenting Is the Best Modern Treatment Cees Wittens, Maastricht, Netherlands
1:15 pm – 1:30 pm	Against, No There Are Better Alternatives Peter Gloviczki, Rochester, MN
1:30 pm – 1:40 pm	Discussion, Q&A
1:40 pm – 1:50 pm	Vascular Training In the USA Jason Lee, Stanford, CA
1:50 pm – 2:00 pm	Vascular Training in Australia and New Zealand Thodur Vasudevan, Hamilton, Australia
2:00 pm – 2:10 pm	Technical Skills Assessment of Vascular Trainees – Analysis of Performance In A Bi-National Cohort Over Six Years Mark Jackson, Gold Coast, Australia
2:10 pm – 2:20 pm	Non-Technical Skills Training For the Operating Room Guil Pena, Adelaide, Australia
2:20 pm – 2:30 pm	Continued Evolution of Vascular Surgery Fellowship Graduate Operative Experience In the United States Jeffrey Jim, St. Louis, MO
2:30 pm – 3:00 pm	Afternoon Refreshment Break (ANZ)

3:00 pm – 5:00 pm

TRAINEE RESEARCH PRESENTATIONS

*Selected Presentations from the WVS and
Australian and New Zealand SVS*

Co-Chairs: Peter A. Schneider & John Quinn

VA004

**Improving Care and Outcomes for Older
Vascular Surgical Patients**

Alison Mudge, Prue Mcrae, Michael Reade, Peter
Donovan, Jason Jenkins, Melanie Foster, Philip
Walker—Royal Brisbane and Women's Hospital,
Queensland, Australia

MONDAY

PURPOSE: Geriatric syndromes are common in older vascular surgery inpatients and associated with poorer outcomes. Multidisciplinary geriatric interventions can reduce geriatric syndromes in other inpatient groups. This pilot study examined the impact of a multi-disciplinary improvement intervention for older vascular surgery patients.

METHODOLOGY: Prospective study of vascular surgical inpatients 65 years and older admitted to a tertiary hospital vascular surgery service; cohorts enrolled before and after implementation of “Eat Walk Engage” programme and proactive medical consultation. “Eat Walk Engage” facilitates clinical, environmental and workforce interventions to improve nutritional care, mobility and cognitive engagement. Implementation was supported by improved multidisciplinary communication, clinical champions, audit and feedback, and an additional health assistant. Medical service included a senior medical fellow on the ward and twice weekly joint medical/surgical consultant rounds. Major outcomes were length of stay (vascular ward and total hospital stay) and geriatric syndromes including delirium (Confusion Assessment Method), functional decline (increase in activities of daily living assistance between admission and discharge), hospital-acquired pressure injury and falls.

RESULTS: 113 pre-implementation and 124 post-implementation participants were enrolled (mean age 75 years, 46% elective, 54% urgent/inter-hospital transfer). The post-implementation group had a shorter vascular ward (10.0 vs. 12.5 days, $p=0.047$) and total (12.6 vs. 16.7 days, $p=0.065$) length of stay. They were less likely to develop a geriatric syndrome (24.2% vs. 36.0%, $p=0.048$), including less functional decline (14.5% vs. 24.3%, $p=0.056$), delirium (14.5% vs. 21.4%, $p=0.16$) and hospital acquired pressure injury (4.0% vs. 11.6%, $p=0.03$).

CONCLUSION: A multidisciplinary, multi-component intervention significantly reduced length of stay and geriatric syndromes in older vascular patients.

26.§ (WVS)

Survival and Reintervention Risk By Patient Age and Preoperative Abdominal Aortic Aneurysm (AAA) Diameter Following Endovascular Aneurysm Repair (EVAR)

Afra U. Janarious¹, Robert J. Hye¹, Priscilla H. Chan¹, Guy Cafri¹, Robert W. Chang², Thomas F. Rehring³, Nicolas A. Nelken⁴, Bradley B. Hill⁵—

¹Kaiser Permanente, San Diego, CA; ²Kaiser Permanente, South San Francisco, CA; ³Kaiser Permanente, Denver, CO; ⁴Kaiser Permanente, Honolulu, HI; ⁵Kaiser Permanente, Santa Clara, CA

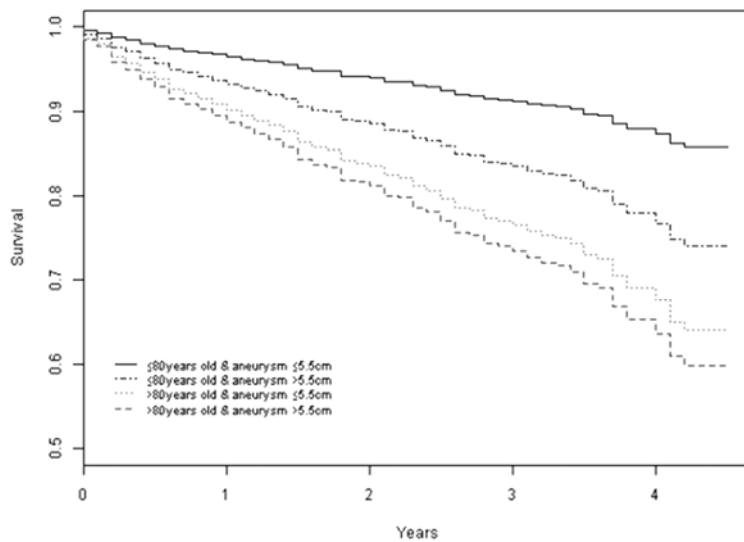
OBJECTIVE: EVAR is the standard of care for AAA but questions remain regarding benefit in high risk and elderly patients. The purpose of this study was to examine the effect of age and preoperative AAA diameter on survival and reintervention rates following EVAR.

METHODS: A retrospective cohort study was conducted using registry data from a large integrated healthcare system. Patients undergoing elective EVAR between 1/1/2010-6/30/2014 were included in the study. Of interest was the effect of patient age at time of surgery (≤ 80 vs > 80 years-old), preoperative AAA diameter (≤ 5.5 cm vs > 5.5 cm), and their interaction. Primary endpoints were all cause mortality and reintervention (conversion to open, revision, or secondary intervention). Between-within mixed effects Cox models with propensity score weights were fit. Hazard ratios (HR) and 95% confidence intervals (CI) were reported. Kaplan-Meier curves were generated of all-cause mortality and reintervention.

RESULTS: Of 1967 patients undergoing EVAR, 778(40%) were ≤ 80 years-old with AAA ≤ 5.5 cm, 731(37%) were ≤ 80 years with AAA >5.5 cm, 193(10%) >80 years with AAA ≤ 5.5 cm and 265(13%) were >80 years with AAA >5.5 cm. Patients > 80 years were less likely to be active smokers but more likely to have renal insufficiency and history of myocardial infarction. All-cause mortality after controlling for co-morbidities and confounders is shown (Fig 1). Overall survival at 4 years after EVAR for patients >80 years with AAA larger and smaller than 5.5cm was 63.6% and 67.6% respectively; for patients ≤ 80 years, 76.8% and 87.3%. When adjusted for mortality, there was insufficient evidence for an interaction between age and AAA size ($p=0.309$). Patient age >80 was associated with 2.53-fold higher risk (HR=2.53 95%CI 1.73-3.70, $p<0.001$), while AAA >5.5 cm are associated with 1.75-fold higher risk(HR=1.75, 95%CI 1.26-2.45, $p=0.001$) (Table 1). For reintervention risk, there were no significant interactions or main effects of age or AAA diameter.

CONCLUSION: When controlling for other co-morbidities, patient age > 80 and AAA diameter > 5.5 cm are independently predictive of decreased survival following EVAR. Nevertheless, overall survival of 63.6% at 4 years in these high risk patients is acceptable and should not preclude repair of AAA on the basis of age or diameter alone.

Figure 1. Modeled Kaplan-Meier Survival Curve of All-Cause Mortality After Endovascular Aneurysm Repair By Patient Age and Pre-Operative AAA Size.



*Fit with Cox proportional hazards regression model with propensity score weights using one missing imputation dataset

MONDAY

Table 1. Post-operation death hazard ratio by patient age (cutoff value 80 years-old) and aneurysm size (cutoff value 5.5 cm).

Model 1*	Estimate	SE	HR	LCL	UCL	p-value
Fixed Effect:						
≤80 years old & AAA≤5.5cm			(Reference)			
≤80 years old & AAA>5.5cm	0.66	0.20	1.94	1.32	2.86	<0.001
>80 years old & AAA≤5.5cm	1.09	0.25	2.98	1.82	4.90	<0.001
>80 years old & AAA>5.5cm	1.35	0.23	3.87	2.47	6.08	<0.001
Random Effect:						
	SD					
Surgeon (Intercept)	0.37					
Hospital (Intercept)	0.18					

Calculation from Model 1	Estimate	SE	HR	LCL	UCL	p-value
Age & AAA Interaction	-0.40	0.39	0.67	0.31	1.45	0.309
AAA Main Effect	0.56	0.17	1.75	1.26	2.45	0.001
Age Main Effect	0.93	0.19	2.53	1.73	3.70	<0.001
<i>Among >80 years old patients</i>						
AAA>5.5cm vs AAA≤5.5 cm	0.26	0.34	1.30	0.66	2.54	0.445

SE = standard error

HR = hazard ratio

LCL = 95% lower confidence limit

UCL = 95% upper confidence limit

AAA = abdominal artery aneurysm

SD = standard deviation

*Fit with between-within mixed effects Cox models with propensity score weights

VA009

Evaluation of Aortic Diameters In A Population Undergoing CT Xolonography: Prevalence and Effect On Survival

Manar Khashram, Anshuman Gupta, Mohamud Osman, Greg Jones, Justin Roake - University of Otago, Christchurch, Christchurch, New Zealand

PURPOSE: Females have smaller aortic diameters, present with abdominal aortic aneurysm (AAA) rupture with smaller aortas and have worse major adverse outcomes compared to males with AAA. In New Zealand, the “normal” aortic diameter is unknown since AAA population screening has not been established. The objective of the study was to determine aortic diameters in individuals undergoing CT Colonography (CTC) for gastrointestinal symptoms.

METHODS: 4644 consecutive CTC scans were performed in Canterbury, New Zealand over a 4-year period. Aortic diameters of all people were measured in short axis in the transverse plane at five points: supraceliac, suprarenal, proximal infrarenal, mid infrarenal and 1cm above the aortic bifurcation. Clinical, demographical and survival outcome data were recorded for all individuals. AAA was defined as <3cm.

RESULTS: 3719 people over the age 55 years old were included in this analysis of which 2,166 (58.4%) were females. The median (range) age for males and females was 72.8 (55-97) and 73.0 (55-96) years respectively. The survival follow-up period was 3 years. The median aortic diameters at the supraceliac, suprarenal, infrarenal, mid abdominal aorta and aortic bifurcation were 2.67, 2.31, 2.09, 2.05 and 1.97 cm in males. The corresponding values in females were 2.45, 2.06, 1.81, 1.73 and 1.65 cm. The prevalence of AAA in males and females was 12.7% and 2.95% respectively. When adjusting for age, females with an AAA had lower survival compared to females with 1.5-2.1cm aortas, hazard ratio 1.65 (95%CI: 1.06-2.55) P< 0.03. There was no association between aortic size and survival in males when adjusting for age.

CONCLUSIONS: In this cohort the median aortic diameter was determined and males had larger dimension in all measured aortic segments than females. The presence of AAA was a predictor of worse survival in females but not in males.

MONDAY

27.§ (WVS)

Distance To the Base of Skull: A New Predictor of Complications In Carotid Body Tumor Resection

Gloria Y. Kim¹, Peter F. Lawrence¹, Alberto Munoz², Gustavo Oderich³, Kuauhyama Luna-Ortiz⁴, Steven Farley¹, Rameen S. Moridzadeh⁵, Vascular Low Frequency Disease Consortium¹—
¹David Geffen School of Medicine at UCLA, Los Angeles, CA; ²Clinica Vascular de Bogota, Clinica Palermo, Universidad Nacional de Colombia, Bogota, Colombia; ³Mayo Clinic, Rochester, MN; ⁴Instituto Nacional de Cancerología, Tlalpan, Mexico; ⁵New York University School of Medicine, New York, NY

OBJECTIVE: We conducted a large, multi-institutional study to assess the complications in patients undergoing carotid body tumor (CBT) excision. Comparisons of outcomes were made based on a traditional measure, Shamblin classification, and a new measure, distance to the base of skull (BOS).

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

RESULTS: 302 CBTs were excised in 293 patients (mean age 52 years, 73% female); 34% were Shamblin I, 42% Shamblin II, and 24% Shamblin III. The mean diameter was 3.8 cm (range, 1-11.3 cm) and mean volume was 25 cm³ (range, .1-205 cm³). Twenty-three percent had cranial nerve (CN) injuries. Patients with higher Shamblin class had more bleeding, temporary CN injuries, and vascular reconstruction (Table 1). Shorter distance to BOS was associated with increased bleeding (p=.02) and permanent CN injury (p=.002). Patients with and without embolization (EMB) (22% and 78%, respectively) had no difference in CBT size, but EMB patients had significantly shorter distance to BOS (2.3 vs 3.7 cm; p=.001). After adjusting for tumor size and distance to BOS, EMB was not associated with decreased bleeding (mean EBL 209 vs 257 ml; p=.78); however, it was associated with increased operative time (192 vs 141 mins; p=.01) and CN injuries (22% vs 13%; p=.003).

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

Table 1. Comparison of Shamblin I, II and III Carotid Body Tumors (CBTs).

Variables	All CBTs (n=295) Mean (SD, range)	Shamblin I (n=101) Mean (SD, range)	Shamblin II (n=125) Mean (SD, range)	Shamblin III (n=69) Mean (SD, range)	P
Maximal diameter, cm	3.90 (1.77, 1-15)	2.69 (1.03, 1-8)	4.10 (1.40, 1.75-11.3)	4.99 (1.48, 1.4-8)	<.001
Volume, cm ³	30.8 (97.0, 0.131-1539)	8.98 (14.6, 0.131-106)	26.4 (28.3, 1.43-160)	44.9 (42.5, 1.06-205)	<.001
Distance to BOS	3.41 (2.08, 0-10)	3.38 (1.65, 0-10)	3.70 (2.20, 0-10)	3.07 (2.32, 0-9)	.588
EBL, ml	248 (430, 0-3500)	149 (247, 0-2300)	237 (386, 10-2400)	436 (436, 0-3500)	<.001
	No. (%)	No. (%)	No. (%)	No. (%)	P
Preoperative EMB	64 (22)	7 (7)	36 (29)	21 (30)	<.001
Vascular reconstruction	13 (4)	1 (1)	4 (3)	11 (16)	<.001
ECA ligation	33 (11)	4 (4)	10 (8)	18 (26)	<.001
CN injury	69 (23)	8 (8)	30 (24)	29 (42)	<.001
Temporary	44 (15)	6 (6)	18 (14)	19 (28)	<.001
Permanent	25 (8)	2 (2)	12 (10)	10 (14)	.003

MONDAY

VA006

Procedural Benefits of Three-Dimensional Image Fusion Angiography During EVAR Are Associated With Improved Post-Operative Outcomes

Joseph Dawson, Lina Hua, Koah Doan, Nicholas Bajic, Robert Fitridge—University of Adelaide
Discipline of Surgery, South Australia

PURPOSE: Three-dimensional image fusion angiography (3D-IF) during EVAR allows the amalgamation of pre-operative computerised tomography images with live fluoroscopy, resulting in a 3D volume rendered angiogram, which can be used as a virtual roadmap during EVAR. We have previously demonstrated that this technology is associated with quicker procedure time, reduced contrast dose and radiation exposure. The purpose of this study was to determine whether these effects have any relevance regarding clinical outcomes.

METHODOLOGY: Fifty-five consecutive patients who underwent EVAR utilising conventional two-dimensional fluoroscopy were compared to 74 consecutive patients who underwent EVAR using 3D-IF. Complex EVAR including thoracic, fenestrated, branched and emergency procedures were excluded. Fluoroscopy time, radiation dose, contrast volume, pre-and post-operative creatinine, presence of endoleak and length of stay (LOS) were all recorded.

RESULTS: 3D-IF was associated with a reduction in fluoroscopy time (21.2 minutes (18.2-31.4) vs 30.0 minutes (23.8-40.8), $p<0.0001$), administration of contrast volume (100mls (80-131) vs 150mls (110-221), $p<0.0001$) and skin dose radiation (781.5 mGy (495-1347) vs 1235 mGy (933.5-1987), $p=0.0006$). This was associated with a 40% reduction in post-procedure renal dysfunction (28.4% vs 50.9%) and contrast-induced nephropathy (CIN) (5.4% vs 9.1%). There were more graft related complications in the 2D group including type 1 and 3 endoleaks (9.1% vs 1.4%, $p=0.04$). LOS (a surrogate marker of post-operative morbidity) was lower in the 3D group (3 days (2-5) vs 4 days (3-7), $p=0.0003$).

CONCLUSION: We have demonstrated that the procedural benefits of 3D-IF (reduced fluoroscopy time, contrast volume and skin dose radiation) are associated with a reduction in post-operative complications including CIN and clinically significant endoleaks. It is likely that such benefits are even more pronounced in complex endovascular procedures such as FEVAR.

28.§ (WVS)

Renal Function Changes Following Fenestrated EVAR

Kenneth Tran¹, Andres Fajardo², Brant Ullery¹,
Christopher Goltz², Jason Lee¹—¹Stanford
University, Stanford, CA; ²Indiana University,
Indianapolis, IN

OBJECTIVE: Limited data exist regarding the impact of fenestrated EVAR (F-EVAR) on renal function. We aimed to perform a comprehensive analysis of acute and chronic renal function changes in patients after F-EVAR.

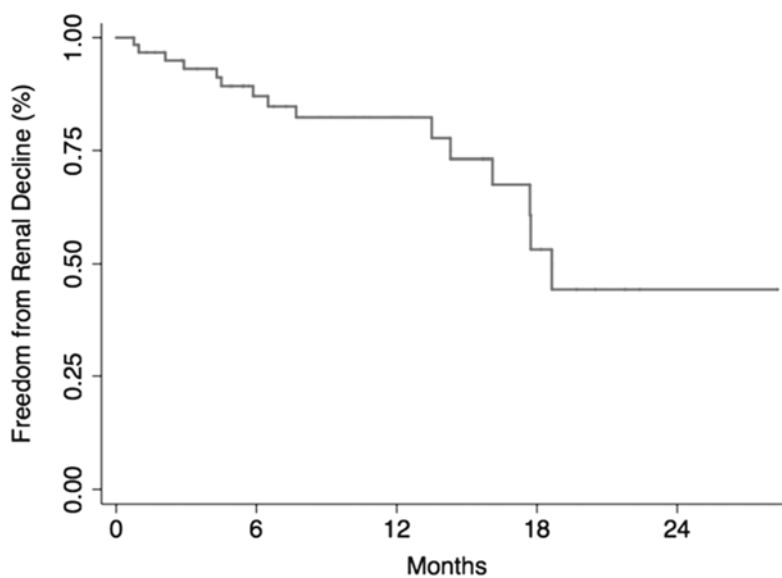
METHODS: This study included patients undergoing F-EVAR at two institutions between September 2012 and March 2015. GFR was estimated using the MDRD formula with serum creatinine levels obtained during the study period. Acute and chronic renal dysfunction was assessed using the RIFLE criteria and CKD staging system, respectively.

RESULTS: 110 patients underwent F-EVAR for juxtarenal or paravisceral aortic aneurysms with a mean follow-up of 11 months. A total of 221 visceral stents were placed (206 renal, 13 SMA, 2 celiac), with a mean aneurysm size of 6.52 cm (range, 4.5-10.5 cm) and a mean neck length of 4.75 cm. Primary renal stent patency of 96.7% at latest follow-up. The majority (54%) of patients had moderate kidney disease (\geq CKD3) at baseline, with a mean preoperative GFR of 60.9 ± 23.6 ml/min/1.73m². Acute kidney injury occurred in 25 (22.7%) patients, though the majority of these were classified as mild dysfunction (n=14, 56%). Three patients (2.7%) were discharged with progressive renal dysfunction requiring dialysis. During follow-up, 47 patients (74.6%) were found to have no change or improved renal disease by CKD staging and 15 patients (23.8%) had a one CKD-stage increase. No additional patients developed end-stage renal disease requiring dialysis during the remaining follow-up period. Mean survival from significant renal decline was 18.6 months (Figure 1). Surrogate markers for higher operative complexity (operating time, P=.007; fluoroscopy time, P<.001; contrast volume, P=.05; blood loss, P<.001) served as dependent risk factors for AKI, though no independent predictors were identified. No significant independent predictors of long-term renal decline were found.

CONCLUSIONS: The incidence of acute and chronic renal dysfunction following F-EVAR is comparable to other reports of open or endovascular repair of juxtarenal aneurysms. Routine biochemical analysis and branch vessel surveillance remain important aspects of clinical follow-up for patients undergoing F-EVAR.

MONDAY

Figure 1.



VA007

Review of Vascular Anterior Exposure For Anterior Lumbar Interbody Fusion

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Royal North Shore Hospital, Sydney, Australia

OBJECTIVE: This retrospective review is to evaluate and review the vascular exposures performed at a tertiary institution from January 2010 to April 2015. This allow us to determine the factors that will affect patient outcome.

METHODS: The 50 month review is based on the AVA database maintained by the unit vascular surgeons. The exposure is a modification of the approach described by Brau with a median vertical incision and a left sided preperitoneal dissection for L4-L5 exposure and a right sided preperitoneal dissection for L5-S1 exposure. Preoperative assessment included an assessment by the vascular surgeon and spinal surgeon. DVT prophylaxis was commenced intraoperatively and continued until discharge. Minor vessel injury requiring a single lateral suture, major vessel injury requiring suture ligation or reconstruction and failed exposure was documented. Postoperative complications such as deep vein thrombosis, pulmonary embolism, wound complication and retrograde ejaculation in males was recorded.

RESULTS: Two hundred and three patients underwent ALIF exposure performed by the vascular surgeons on the unit of which 110 (55.2%) were male and 93 (45.8%) were female. The mean BMI was 30.8. Minor vessel injuries were 11 (5.5%) with 3 (1.5%) major injuries. Five (2.5%) DVT cases were noted. Two wound complication, one rectus sheath hematoma (0.5%) and one superficial wound dehiscence (0.5%) were noted in the series. Retrograde ejaculation was noted in 1 of the males (0.9%). There was no mortality or failure to expose in the group.

CONCLUSION: Data demonstrates that injuries were all venous and that two level exposure and increased BMI had a higher risk of venous injury. ALIF can be performed safely by vascular surgeons with acceptable risk. Careful patient selection especially in the two level exposure will mitigate complications. Increasing demand for this procedure will require ALIF to be formally taught in Vascular Surgical training as there is a steep learning curve.

MONDAY

29.§ (WVS)

Contemporary Outcomes Following Imaging-Guided Treatment of Patients With May-Thurner Syndrome

Johnathon C. Rollo, Steven Farley, Adam Oskowitz, Juan Carlos Jimenez, Brian DeRubertis—University of California Los Angeles, Los Angeles, CA

OBJECTIVE: Patients with May-Thurner Syndrome present with a spectrum of findings ranging from mild left leg edema to extensive iliofemoral deep venous thrombosis. While asymptomatic left common iliac vein (LCIV) compression can be seen in a high proportion of normal individuals on axial imaging, the percentage of these persons with symptomatic compression is quite small, and debate exists regarding the optimal clinical and diagnostic criteria to treat these lesions in patients with symptomatic venous disease. We evaluated our approach to image-guided therapy for individuals with symptomatic LCIV compression and report the outcomes.

METHODS: All patients with suspected May-Thurner compression of the LCIV between 2008-2015 were analyzed retrospectively. Patients with chronic ilio caval lesions not associated with compression of the LCIV were excluded from analysis. Criteria for intervention included LCIV compression in the setting of (1) leg swelling/venous claudication with associated venographic findings (collateralization, iliac contrast stagnation and contralateral cross cross-filling) or (2) left leg deep venous thrombosis. Presenting CEAP score, post-intervention CEAP score, primary and secondary patency, and IVUS data were reviewed.

RESULTS: Of the 55 patients evaluated, 22 (40%) had non-thrombotic symptomatic compression of the LCIV and 33 (60%) had thrombotic May-Thurner Syndrome with LCIV compression and acute or chronic DVT. Symptoms included pain/swelling (100%), venous claudication (58.1%), or CEAP class 3 (89%). Forty-seven patients underwent successful intervention with angioplasty (6%) angioplasty and stent (59%) or lysis, angioplasty and stenting (27%). Clinical improvement occurred in 97.9% and a decrease in CEAP score in 76.6%. Complete symptom resolution was achieved in 54.5%. Complications included 2 early reocclusions. Primary and secondary 1-year patency was 94% and 98% (mean follow-up 20.3 months).

CONCLUSIONS: Image-guided treatment of May-Thurner Syndrome is associated with excellent 1-year patency rates and a significant reduction in symptoms and CEAP score. Treating symptomatic May-Thurner patients based on physiologically relevant venographic findings may lead to superior long term patency and clinical outcomes than IVUS-guided decision-making.

VA008

Five Year Results for Popliteal Aneurysm Surgery From the AVA: Graft Patency and Limb Loss Is Determined By ASA Grade, Conduit Quality, Runoff Vessels and Emergent Surgery

Chelsea Beinke, Irwin Mohan, Kerry Hitos, Bernie Bourke, Barry Beiles—Westmead Hospital, Sydney, Australia

PURPOSE: The Australasian Vascular Audit is a prospective bi-national database for all vascular procedures. We analyzed data for popliteal artery aneurysm (PAA) interventions from 2010 to 2014.

METHODOLOGY: 1316 patients had PAA repair either by bypass (920) or stent graft (396), 77.7%(1022) were elective procedures, and 14.4% were urgent, and 8.0% were emergency. 94.5% were male. Median length of stay was 2 days for stents and 8 days for bypasses. Data were collected up to discharge and used to perform a univariate analysis and create multiple regression models. Data were assessed using SPSS, $p < 0.05$ was considered significant.

RESULTS: Urgent or emergency cases were treated with stent-grafts in 15.2% and bypass-grafts in 25.4% of cases. 22.5% had single-vessel runoff, 35.0% had two-vessel, 35.9% had three-vessels. 6.6% had no named runoff vessels. Graft occlusion occurred in 37(4.0%) bypasses and 5(1.3%) stents ($p=0.009$). A sub-optimal conduit increases the risk of occlusion or amputation by 6.8 times compared to a good quality conduit (95% CI: 3.09-15.06; $P < 0.0001$). Graft occlusion, amputation or death, occurred in 7(1.8%) stented patients and 38 (4.1%) patients with bypass, ($p=0.031$). Graft occlusion, amputation or death, increases with emergency repair by 3.3-fold (95% CI: 1.47-7.52; $P=0.004$), and an ASA score of IV increases the risk by 5.3 times (95% CI: 1.73-16.12; $P=0.003$). Failed repair or reintervention increases for a 1-vessel or blind-popliteal compared to 3-vessel runoff (OR: 3.13; 95% CI: 1.28-7.65; $P=0.013$); and the risk of amputation or occlusion also increases for 1-vessel or blind-popliteal when compared to 3-vessel runoff (OR: 2.72; 95% CI: 1.26-5.89; $P=0.011$).

CONCLUSIONS: A good quality conduit is essential. Urgent or emergency surgery in symptomatic patients increases the risks of reintervention, graft occlusion, amputation or death from PAA repair. Graft patency and limb loss was determined by ASA grade, conduit quality, runoff vessels and emergent surgery.

MONDAY

30.§ (WVS)

A Comparison of Brachial Artery-Brachial Vein Arteriovenous Fistulas With AV Grafts In Patients With Poor Superficial Venous Anatomy

Jerry J. Kim, Ezinne J. Ihenachor, Aaron B. Parrish, Jenny D. Bleck, Matthew C. Koopmann, Christian de Virgilio—Harbor-UCLA Medical Center, Torrance, CA

OBJECTIVE: The autogenous arteriovenous fistula (AVF) has been shown to be superior to the arteriovenous graft (AVG) with respect to cost, complications, and primary patency. Therefore, the NKF-KDOQI guidelines recommend reserving AVGs for patients who do not have adequate superficial venous anatomy to support AVF placement. The brachial artery-brachial vein arteriovenous fistula (BVAVF) has emerged as an alternative. However, there is limited data comparing BVAVF and AVG in patients who are otherwise not candidates for traditional AVF.

METHODS: A retrospective review of all patients who received BVAVF from July 2009 to July 2014 was performed. Patients who received AVG and matched for age, gender, diabetes, and superficial venous anatomy were used for comparison to the BVAVF group. Patient demographic data, operative details, and subsequent follow-up were collected. BVAVFs were performed with a two stage approach with initial arteriovenous anastomosis followed by delayed superficialization or transposition. Comparisons were performed using the Student's t-test and chi-squared test as appropriate. Our primary outcome measure was patency at 1 year.

RESULTS: Thirty-one patients underwent BVAVF during the study period. There were 40 patients in our matched AVG group. There was no difference in age, gender, diabetes, prior hemodialysis access, or absence of usable superficial vein between the two groups. The median days to cannulation from the initial operation was 141 in the BVAVF group and 30 in the AVG group ($P < 0.001$). More patients required interventions to maintain or reestablish patency in the AVG group than the BVAVF group (35.0% vs. 9.7%, $P = 0.013$). Assisted primary patency at 1 year was superior in the BVAVF group (65.5% vs. 40.6%, $P = 0.018$). Functional assisted primary patency at 1 year was also superior in the BVAVF group (48.1% vs. 21.6% $P = 0.040$). Functional secondary patency at 1 year was similar (BVAVF 55.5% vs. AVG 48.6%, $P = 0.62$).

CONCLUSIONS: BVAVF had higher primary patency than AVG, whereas secondary patency was similar. These findings support the use of BVAVF as a viable alternative to AVG in patients with inadequate superficial venous anatomy. The decision to perform BVAVF must be weighed against the delay in functional maturation expected as compared to AVG.

7:00 pm – 10:00 pm **WVS EVENT**
Presidents Reception, Dinner & Entertainment
Dress Code: Island smart casual—event is outdoors.

TUESDAY, SEPTEMBER 22, 2015

7:30 am – 8:00 am **Continental Breakfast With Educational Exhibitors**

8:00 am – 12:00 pm **WVS/ANZSVS SESSION II**
Co-Chairs: Jason Lee & Andrew Hill

8:00 am – 10:00 am **TRAINEE RESEARCH PRESENTATIONS**
Selected Presentations from the WVS and Australian and New Zealand SVS

VA016

Five Year Result of Aortic Intervention in the AVA Increasing Complexity of Open Surgery, ASA Grade and Symptomatic Patients Increase Risks

Daniel Nguyen, Kerry Hitos, Bernie Bourke, Barry Beiles, Irwin Mohan—Westmead Hospital, NSW

TUESDAY

PURPOSE: The Australia and New Zealand Society for Vascular Surgery (ANZSVS) recently established the Australasian Vascular Audit, a prospective bi-national database for all vascular procedures. We analyzed data for aortic interventions from 2010 to 2014.

METHODOLOGY: 11564 aortic procedures were performed, 64% were treated endovascularly (EVAR) and 36% with open surgery (OPEN). 77.5% were elective, 7.7% semi-urgent, and 14.8% emergency. 83.5% were male; median aneurysm diameters were 57mm(EVAR) vs 60mm(OPEN). More EVAR patients were hypertensive, diabetic and with IHD; renal failure and smokers were more common in OPEN group. Median length of stay was 5-days for EVAR vs 10-days for OPEN. Data were analysed using SPSS, univariate analysis and multivariate modelling was performed, $p < 0.05$ was considered significant.

RESULTS: Post-operative bleeding, wound complications, and unplanned return to theatre occurred more in OPEN ($p < 0.001$). Cardiac, respiratory and renal complications were more frequent with OPEN, ($p < 0.0001$). Supra-renal clamps were employed 24.4% of OPEN cases, death rates were 5.1% overall, 1.5% for EVAR vs 11.4% for OPEN, ($p < 0.0001$). ASA III increased risk of complication or death by 1.35-fold (95% CI: 1.11-1.65; $P = 0.003$) compared to ASA I-II, and ASA IV-V increased the risk of complication or death by 3.05

(95% CI: 2.20-4.22; P<0.0001). Creatinine >150mMol/L increased the risk of a complication or death two-fold (95% CI: 1.62-2.53; P<0.0001). Females have 1.3-fold higher risk of complication or death (95% CI: 1.03-1.58; P=0.026). Symptomatic AAA increased the odds of a complication or death by 1.76 (95% CI: 1.32-2.35; P<0.0001) compared to elective aneurysm.

CONCLUSIONS: Complications including death were more frequent in the OPEN group, but renal failure was a more common starting point; suprarenal clamps were required in almost a quarter of cases. Increasing ASA Score and symptomatic aneurysms increased the risks from AAA repair regardless of technique.

31.§ (WVS)

Arterial Cut-Down Reduces Complications Following Brachial Access for Peripheral Vascular Interventions

Marcus R. Kret¹, Ronald L. Dalman², Jeffrey Kalish³, Matthew W. Mell²—¹Stanford University Medical Center, Stanford, CA; ²Stanford University School of Medicine, Stanford, CA; ³Boston Medical Center, Boston, MA

OBJECTIVES: Factors influencing risk for brachial access site complications (BASC) following peripheral vascular intervention (PVI) are poorly understood. We queried the SVS Vascular Quality Initiative (VQI) to identify unique demographic and technical risks for BASC.

METHODS: The VQI PVI data files from years 2010 to 2014 were analyzed to compare puncture-site complication rates and associations encountered with either brachial or femoral arterial access for PVI. Procedures requiring multiple access sites were excluded. BASC were defined as wound hematoma or arterial occlusion. Univariate and hierarchical logistic regression was used to identify independent factors associated with site complications following brachial access.

RESULTS: Of 44,602 eligible PVI procedures, 732 (1.6%) were performed via brachial access. Brachial access was associated with an increased complication rate compared with femoral access (9.0% vs. 3.3%, $P<.001$), including more hematomas (7.2% vs. 3.0%; $P<.001$) and access site occlusions (2.1% vs 0.4%; $P<.001$). On univariate analysis, factors associated with BASC included age, female gender and sheath size. BASC occurred less frequently following arterial cut-down (4.1%) compared with either ultrasound-guided (11.8%) or fluoroscopically-guided percutaneous access (7.3%; $p=0.047$). Neither surgeon's overall PVI experience nor prior experience with brachial access predicted likelihood of adverse events. By multivariate analysis, male gender (OR 0.47, 95% CI 0.27-0.83, $p<0.01$), arterial cut-down (OR 0.25, 95% CI 0.07-0.87, $p=0.04$), and smaller sheath sizes (OR 0.57, 95% CI 0.37-0.87, $p=0.01$) were associated with significantly decreased risk for BASC.

CONCLUSIONS: Brachial access for PVI carries significantly increased risks for access site occlusion or hematoma formation. Arterial cut-down and smaller sheath diameters are associated with lower complication rates and thus should be considered when arm access is required.

TUESDAY

VA010

Independence of Extent of Tortuosity and Calcification In Iliac Arteries

Benjamin Thurston, Nicholas Dowson, Prue Cowled, Margaret Boulton, Robert Fitridge—
University of Adelaide, Adelaide, Australia

PURPOSE: Both arterial tortuosity and calcification are potentially linked to complications subsequent to Endovascular Aneurysm Repair (EVAR). However it is unclear whether these two factors are independent and if calcification is predictive of future complications. Hence this study examines tortuosity and calcification in the context of predicting problems within 30 days of EVAR.

METHODOLOGY: A previously published vessel tracking algorithm was used to extract the iliac arteries from a pre-operative CT-angiograms of patients who underwent EVAR. Maximal tortuosity on each side was computed (at a scale of 10mm). The algorithm was also used to identify the location and size of all calcified regions adjacent to vasculature. Probability distributions of tortuosity at all vessel locations and at the locations proximal calcifications were compared using the Kullback-Liebler Divergence (KLD). A scatter plot of number of calcifications larger than 0.2ml in size (calcification burden) versus the maximum tortuosity was generated.

RESULTS: From an initial 71 patients, 15 patients were censored due to algorithmic failures. For the remaining 56 patients the KLD between curvature at all locations and restricted to calcifications was 0.076 indicating that the two distributions were almost identical. Calcification burden and tortuosity did not appear to separate patients with and without early problems, although 6 of the 10 patients with early problems had either a relatively high burden or high tortuosity, but not both.

CONCLUSION: Calcifications did not appear to particularly favour in regions of high or low tortuosity, and calcification is likely to be independent of tortuosity. A clear separation between patients with and without early problems could not be established. However, most patients with early problems had either unusually high calcification or tortuosity, implying that together the two factors may be prognostic, although more data would be needed to confirm this.

32.§ (WVS)

SPY Technology As A Valuable Measure for Lower Extremity Interventions—A Prospective Evaluation

Benjamin Colvard¹, Elizabeth Hitchner², Qingfeng Sun³, Becky Long⁴, George Lee¹, Oliver Aalami¹, Wei Zhou¹—¹Stanford University, Stanford, CA; ²VA Medical Center - Palo Alto, Palo Alto, CA; ³Harbin Medical University, Harbin, China; ⁴VA Medical Center Palo Alto, Palo Alto, CA

OBJECTIVE: Lack of a reliable outcome measure often leads to excessive or insufficient interventions for chronic limb ischemia (CLI). SPY technology, widely adapted by plastic and general surgeons, utilizes laser-assist fluorescence angiography to assess tissue perfusion. We sought to determine the role of SPY as an alternative, perhaps more reliable outcome measures for vascular interventions.

METHODS: A total of 100 patients with Rutherford class 3-6 CLI were prospectively recruited. Among them, 42 had wounds. SPY was performed before and after revascularization procedures under a standard IRB-approved protocol. Quantitative measures of perfusion at plantar surfaces were analyzed and compared to ankle-brachial index (ABI), the current standard measure.

RESULTS: All patients were men (mean age: 69 years), 57% were smokers, 9% had renal dysfunction, and 69% were diabetics. The mean pre-operative ABI was 0.56 (range, 0-1.33). There was a significant increase in ABI following intervention by 51% (absolute increase: 0.27) ($p < 0.001$). Quantitative values of plantar perfusion as measured by SPY were also improved significantly following intervention ($P < 0.001$). Peak perfusion increased by 49% (absolute increase: 47), ingress rate by 88% (absolute increase: 5.9u/sec), and egress rate by 45% (absolute increase: 0.44u/sec). There was a moderate, yet significant correlation between the change in ABI and change in Ingress following revascularization ($r = 0.24$, $p = 0.05$). Procedure-related digital embolization was also observed in several patients despite lack of angiographic finding.

CONCLUSIONS: This is the largest prospective study evaluating SPY technology in vascular interventions. Our study showed that SPY was a valuable alternative to the current standard and provided additional information on regional tissue perfusion. It also helped direct visualization of procedural outcomes. Further investigation is warranted to determine the threshold of SPY value to predict wound healing.

TUESDAY

VA011

Blood Product Ordering Prior To Elective Surgery

Shrikkanth Rangarajan, Andrew Hughes, Douglas Stupart, Martin Mccall-White—Geelong Hospital, Geelong, Australia

AIM: Routine cross-match ordering prior to elective surgery is recommended where there is at least 50% utilisation of cross-matched units. We aimed to make visible elective surgery blood product ordering at a large regional centre and compare our practice to evidence based recommendations. A secondary aim was to assess currency of, and adherence to, the hospital Maximum Surgical Blood Ordering Schedule (MSBOS).

METHOD: We undertook an audit of 10,000 elective surgical procedures, including all surgical specialties, at the Geelong Hospital during 2012. Cross-match and red cell transfusion data was pooled by procedure type. Cross-match utilisation was measured by calculating the cross-match to transfusion ratio for each procedure type and comparing it to evidence based recommendations and the MSBOS.

RESULTS: Notable mismatch occurred in three domains; (1) cross-match ordering v. utilisation, (2) cross-match ordering v. MSBOS, and (3) MSBOS v. evidence based recommendations. Cross-match utilisation was under 50% for all open and endovascular AAA repair, thoracic procedures, single and minimally invasive valve replacements, total knee and hip replacements, all colorectal surgery, radical prostatectomy, and nephrectomy. Although the MSBOS only exceeded evidence-based recommendations for AAA repair and thoracotomy procedures, there was generally poor adherence to the MSBOS. Further, the MSBOS did not cover any cardiac procedures, radical prostatectomy, or shoulder surgery.

CONCLUSION: Our data suggests a tendency to cross-match in excess of current evidence based recommendations. MSBOS's must be evidence based and tailored to reflect red-cell utilisation at each institution. Just as important is ensuring awareness of the institutional MSBOS.

33.§ (WVS)

The Impact of Exposure Technique on Perioperative Complications In Patients Undergoing Open Abdominal Aortic Aneurysm Repair

Pedro G. Teixeira¹, Karen Woo¹, Ahmed M. Abou-Zamzam², Sara L. Zettervall³, Marc Schermerhorn³, Fred A. Weaver, MMM¹—¹University of Southern California, Los Angeles, CA; ²Loma Linda University, Loma Linda, CA; ³Beth Israel Deaconess Medical Center, Boston, MA

OBJECTIVE: Evaluate the impact of exposure technique on perioperative complications in patients undergoing elective open abdominal aortic aneurysm (AAA) repair.

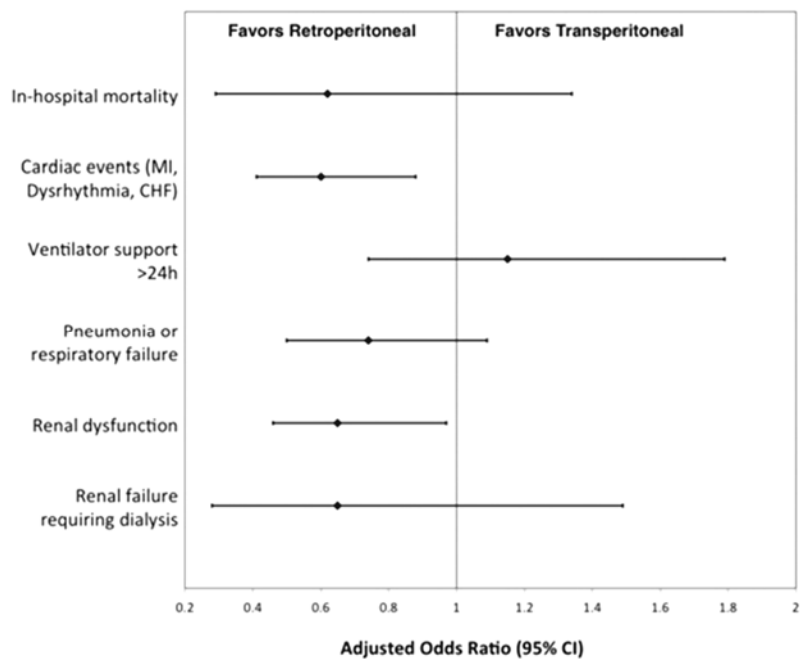
METHODS: Using the Society for Vascular Surgery Vascular Quality Initiative (VQI) database, patients subjected to open AAA repair from January/2003 to July/2014 were identified and divided into two aortic exposure groups, Retroperitoneal (RETRO) versus Transperitoneal (TRANS). Multivariable analysis was performed to compare the incidence of cardiac events (myocardial infarction, dysrhythmia, heart failure), prolonged intubation, renal dysfunction and mortality, adjusting for between-group differences identified on univariate analysis.

RESULTS: Open AAA repair was performed in 3,530 patients, using RETRO in 26% and TRANS in 74%. The RETRO group had a higher rate of supra-renal aortic clamp (60.9% vs. 30.2%, $p < 0.001$), higher proportion of high-risk patients as stratified by the Vascular Study Group Cardiac Risk Index (25.6% vs. 22.2%, $p = 0.038$) and lower rate of iliac aneurysms (18.0% vs. 31.2%, $p < 0.001$). After multivariable analysis, RETRO was associated with a lower incidence of cardiac events (12.2% vs. 16.0%, Adjusted OR [95%CI]: 0.60[0.41-0.88], $p = 0.009$) and renal dysfunction (13.3% vs. 16.5%, Adjusted OR[95%CI]: 0.65[0.46-0.97], $p = 0.011$). No difference in respiratory complications or mortality was identified (Figure).

CONCLUSIONS: Despite increased utilization of supra-renal aortic clamp during elective open AAA repair, the RETRO technique was associated with a lower risk-adjusted incidence of cardiac and renal complications compared to the TRANS technique.

TUESDAY

Figure 1.



WESTERN VASCULAR SOCIETY · 30TH ANNUAL MEETING · MAUI, HAWAII

VA022

**An Endovascular-First Approach for the
Treatment of Critical Limb Ischemia Results in
Superior Limb Salvage Rates**

Taraneh Amir-Nezami, Sydney, Australia

TUESDAY

34.§ (WVS)

Aortic Outflow Occlusion Predicts Rupture of Abdominal Aortic Aneurysm

Jeffrey D. Crawford, Nasibeh Vatankhah, Colin Bohannon, Stephen Haller, Venkat Keshav, Sandra Rugonyi, Erica L. Mitchell, Gregory J. Landry, Gregory L. Moneta, Amir F. Azarbal—Oregon Health and Sciences University, Portland, OR

OBJECTIVES: Peak wall stress (PWS) of abdominal aortic aneurysms (AAA) has been demonstrated to be a better predictor of rupture than AAA diameter alone. However, PWS calculations are time-intensive and not widely available. We sought to identify surrogates of increased PWS and decreased aortic wall strength to better predict rupture risk.

METHODS: Patients treated at our institution from 2001-2014 for ruptured AAA (rAAA) were retrospectively identified. Patients with large (>60mm) non-rAAA with a preoperative contrast computed tomography scan were sequentially collected from 2009 for comparison. Demographics, vascular risk factors, infrarenal aortic calcification scoring using the Agatson's method, maximal aortic diameter and aortic outflow were recorded. Aortic outflow occlusion (AOO) was defined as complete total occlusion of the common, internal or external iliac artery. Computational fluid dynamics and finite element analysis (FEA) simulations were performed using a custom program in MATLAB for preliminary PWS calculations.

RESULTS: We identified 61 patients with rAAA with 15 patients rupturing at diameter of <60mm (small rAAA group, Table 1). Patients with small rAAA were more likely to have AOO compared to non-ruptured AAAs >60mm (26.7% v 8.2%, p=0.047). Among all patients with rAAAs, those with AOO ruptured at smaller mean AAA diameters than patients without AOO (62.1 ± 11.8mm v. 72.5 ± 16.4mm, p=0.024). Peripheral arterial disease (PAD) and chronic obstructive pulmonary disease (COPD) were more common in patients with small rAAA than in non-ruptured AAAs >60mm. Small rAAAs had similar mean Agatson's calcium score compared to large, non-rAAA (3022.8 ± 2162.9 v 7409.9 ± 5376.0, p=0.08). PWS by FEA of a representative aorta modeled with AOO and without AOO constraints showed negligible change in PWS (Figure 1).

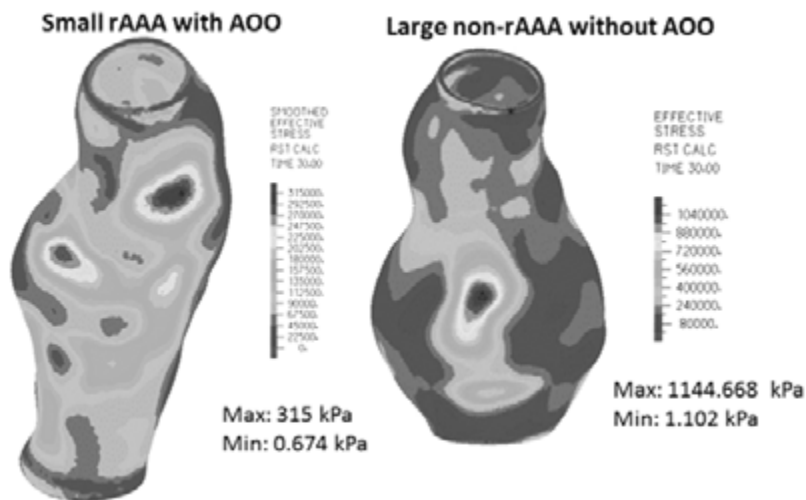
CONCLUSION: We demonstrate that AOO, PAD and COPD in AAA are associated with rAAA at smaller diameters. AOO and PAD appear to indicate systemic atherosclerotic burden rather than increase PWS and therefore, along with COPD may be markers of decreased aortic wall strength. Aortic calcium scoring may be unrelated to rupture risk. We therefore recommend consideration of early, elective AAA repair in patients with AOO and COPD.

Table 1.

	Small rAAA (%) (n=15)	Non-rupture AAA (%) (n=61)	P
AAA (Mean ± SD)	49.9 ± 8.6	69.1 ± 13.5	0.01
Age (Mean ± SD)	68.1 ± 12.3	71.3 ± 13.4	0.02
Male	11 (73.3)	53 (86.9)	NS
CAD	6 (40.0)	21 (34.4)	NS
Hypertension	9 (60.0)	45 (73.8)	NS
Smoker	14 (93.3)	55 (90.2)	NS
COPD	7 (46.7)	11 (18.0)	0.03
PAD	4 (26.7)	5 (8.2)	0.03
Diabetes	2 (13.3)	10 (16.4)	NS
Statin	4 (26.7)	34 (55.7)	NS
Ace-Inhibitor	5 (33.3)	23 (37.7)	NS

TUESDAY

Figure 1.



VA024

Effects of Topical Negative Pressure Therapy on Tissue Oxygenation and Wound Healing in Vascular Foot Wounds

Nathaniel Chiang, Thodur Vasudevan, Jamie Sleigh—Waikato Hospital, Waikato, New Zealand

INTRODUCTION: Topical negative pressure (TNP) therapy is widely used in the treatment of acute vascular wounds. Multiple systematic reviews in recent years have concluded that there is inadequate evidence to support its benefits at a scientific level.

AIM: To determine the effects of TNP on wound healing and tissue perfusion in acute foot wounds.

METHODS: A randomised controlled study was performed to compare TNP with modern traditional dressings. The primary outcome was reduction in wound volume at day 14. Secondary outcomes included changes in surface area, depth, hydroxyproline levels, growth factor TGF- α , and tissue oxygenation of the wound as measured by OxyVu™ at day 0 and 14. Clinical outcomes were also assessed.

RESULTS: Twenty-two patients completed the study. All had either diabetes or dialysis-dependent renal failure. There was no difference in clinical or demographic characteristics, in particular location of the foot wounds. No statistically significant difference was demonstrated in wound volume reduction between the two groups on day 14 (44.2% for TNP versus 20.9% for the control; $p=0.15$). Nevertheless, there was a trend towards a better healing rate in the TNP group in terms of surface area, depth, and volume. The relative reduction in maximum wound depth was statistically significant [36.0% for TNP versus 17.6% for the control) $p=0.03$]. No differences were found with changes in hydroxyproline or TGF- α levels, or in tissue oxygenation at day 14. There was also no significant difference in wound failure-free, amputation-free, or survival rate at 12 months.

CONCLUSIONS: Applying TNP to acute vascular wounds of the foot in patients with diabetes or end-stage renal failure improved the wound healing rate, in particular reducing the relative wound depth. Tissue oxygenation and hydroxyproline levels were not improved, suggesting the difference in healing rate might have been a result of macro-strain effects from contracting wound edges and decreasing tissue oedema.

35.§ (WVS)

A Comparison of RUDI and DRIL for the Management of Severe Access-Related Hand Ischemia

Jonathan D. Misskey, Cathevine Yang, Shaun MacDonald, York Hsiang—University of British Columbia, Vancouver, BC, Canada

OBJECTIVES: Access-related hand ischemia (ARHI) is a potentially limb threatening complication of arteriovenous access for dialysis. Both the distal revascularization-interval ligation (DRIL) and revision using distal inflow (RUDI) procedures allow treatment of ischemic symptoms while maintaining fistula patency. Although outcomes with the DRIL are well established, experience with the RUDI for ARHI remains preliminary. We compared outcomes in these procedures with respect to cumulative patency, resolution of symptoms and patient survival.

METHODS: All patients following autogenous arteriovenous fistula construction at two hospitals between 2005 and 2015 were identified using a large, prospectively maintained database. Patients with severe (SVS grade 3) ARHI were included for analysis.

RESULTS: A total of 2035 autogenous accesses were created during the study period, and 58 (2.8%) developed grade 3 ARHI. Of this cohort, 20 patients underwent RUDI and 21 had a DRIL. The indication for intervention was tissue loss (61%) or ischemic rest pain (39%). Mean age was 57.5, and 53.7% of patients were female. Most patients had diabetes (85.3%) and symptomatic peripheral arterial disease (63.4%). The mean digital brachial index (DBI) was 0.25 +/-0.12. There were no preoperative differences in patient comorbidities between the RUDI and DRIL cohorts. 12-month primary patency (60% vs. 67.7%; $p = 0.658$) and secondary patency (85% vs. 90.5%; $p = 0.592$) were similar between groups. 3 year primary patency (55% vs. 52.4%; $p = 0.867$) and secondary patency (80% vs. 90.5%; $p = 0.343$) also showed no significant difference. Resolution of ischemic symptoms, including resolution or improvement in pain or healing of ischemic ulcers or amputations, occurred in 90% with RUDI and 81% with DRIL ($p = 0.131$). Survival for the RUDI and DRIL groups at 1 and 3 years was 85% vs. 85.7% ($P=0.948$) and 57.9% vs. 49.2% ($p = 0.278$).

CONCLUSIONS: Compared with DRIL, RUDI demonstrated equivalent patency, symptom resolution and survival for the treatment of severe ARHI. Given the poor long term survival, preoperative risk assessment is critical to procedural decision making.

TUESDAY

10:00 am – 10:30 am	Refreshment Break With Educational Exhibitors
10:30 am – 11:10 am	PRESIDENT'S SESSION Presiding: Larry W. Kraiss & Douglas Cavaye
10:30 am – 10:35 am	Address from the President of the WVS Larry W. Kraiss
10:35 am – 10:40 am	Address from the President of the ANZSVS Douglas Cavaye
10:40 am – 10:55 am	Best Evidence-Based Management of DVT and Its Complications Is No Longer Anticoagulations and Stockings—We Have Moved On Cees Wittens , Maastricht, Netherlands
10:55 am – 11:10 am	The Popliteal Aneurysm Conundrum: Open Surgery or Endovascular Repair? Peter Gloviczki Rochester, MN
11:10 am – 11:15 am	Q & A
11:15 am – 12:00 pm	COMBINED WVS/ANZSVS SESSION ON AUDIT AND QUALITY CONTROL IN VASCULAR SURGERY
11:15 am – 11:25 am	Global Vascular Guidelines Update Michael S. Conte, San Francisco, CA
11:25 am – 11:35 am	Challenges, Usefulness and Accuracy of Data In the AVA: The ANZSVS Experience C. Barry Beiles, Melbourne, Australia
11:35 am – 11:45 am	Challenges, Usefulness and Accuracy of Data In the VQI: The US Experience Larry W. Kraiss, Salt Lake City, UT
11:45 am – 11:50 am	Q & A
11:50 am – 12:00 pm	TRAINEE PRIZE PRESENTATION
12:00 pm	Meeting Adjourns

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CONSTITUTION & BYLAWS

ARTICLE I – NAME

The name of this corporation is the Western Vascular Society (hereinafter the “Society”).

ARTICLE II – PURPOSES

The purpose of the Society shall be: (1) to promote study and discussion of the art and science of vascular surgery; (2) to promote exchange of information among the membership; (3) to hold annual meetings; (4) to do and engage in any and all lawful activities that may be incidental or related to the foregoing and to have and exercise all powers and authority now or hereafter conferred upon not-for-profit corporations under the laws of the State of California. Notwithstanding the foregoing, (1) no part of the Corporation’s net earnings or assets shall inure to the benefit of any member, director, officer, or other person, except that the Corporation shall be authorized and empowered to pay reasonable compensation for services rendered and to make other payments and distributions in furtherance of the purposes set forth above, and (b) the Corporation shall not carry on any activity not permitted to be carried on by an organization exempt from federal income tax under section 501 (c) (6) of the Internal Revenue Code of 1954, as amended (the “Code”) or the corresponding provision of any further United States revenue statute.

ARTICLE III – MEMBERSHIP

1. The membership of this Society shall be limited to surgeons who practice primarily vascular surgery, who are in good standing in their community as judged by members of the Society. Candidates for membership shall be certified by the American Board of Surgery Added Certification in Vascular Surgery or the Royal Canadian College of Surgeons Certificate of Special Competence in Vascular Surgery. In exceptional cases, the Membership Committee may elect to accept equivalent periods of training for formal certification.
2. Members shall be drawn from the Western states, provinces and the Pacific Rim. This will be defined as follows: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oklahoma, Oregon, Utah, Washington, Wyoming, Alberta, British Columbia and the Pacific Rim.
3. There shall be five types of members: active, senior, honorary, associate, and adjunct.
4. Active membership shall consist of the following members of the

Organization plus subsequent individuals elected to membership by the Society. The total number of active members shall be limited to 160.

- 4a. Prospective members should have completed a minimum of two (2) years of practice after vascular surgery training before applying for membership.
- 4b. The prospective member should meet one or more of the following three (3) criteria in order to be considered for membership:
 - Excellence in Clinical Care – this can be reflected by letters from colleagues and collaborators, regional reputation, years in practice, peer-recognition awards (Chief of Staff, senior surgeon in group, HMO recognition award), service on peer-review organizations, case lists and outcomes, community involvement or participation in clinical trials.
 - Contributions to Vascular Science – this can be reflected by peer-review publication, non-profit or federal grant support, invited lectures, professorships, faculty appointments, invited publications, participation in clinical trials, device development, active participation in local/regional vascular societies or serving on hospital committees.
 - Contributions to Vascular Education – this can be reflected by teaching responsibilities at a vascular or general surgery training program, hospital grand rounds, seminars, proctorship of new vascular procedures or other lectureships.
5. Senior members shall consist of active members who have reached the age of sixty-five (65) or who for reasons of health or other just cause, the Council recommends for classification in this category. Senior members shall not be bound by requirements for attendance at meetings; however, working senior members shall continue to pay annual dues until such time as they have notified the Secretary-Treasurer that they have left active practice.
6. Honorary members of the Society shall consist of individuals who have made outstanding contributions in the field of vascular science. They shall have no voting privileges. They shall not be required to pay dues.
7. Associate members of the Society shall consist of those individuals who were previously active members but have moved out of the geographic limits of the Western Vascular Society. Associate members shall not be bound by the requirements for attendance at meetings nor shall they be required to pay dues.

8. Adjunct membership will be granted to those individuals who are not vascular surgeons but have made and continue to make meaningful contributions to the science and practice in the field of vascular disease. This category will include non-MDs who are working in the field of research. It will also include physicians who actively practice and publish in the field of non-surgical treatment of vascular diseases. They shall not have voting privileges, be able to hold office, be able to participate on standing committees, and will not be required to pay dues.
9. Prospective members should attend an annual meeting of the Western Vascular Society prior to submitting application for membership. The prospective member is encouraged to attend the annual meeting with his or her spouse or significant other.

ARTICLE IV – SELECTION OF MEMBERS

Qualification for membership in the Society will be judged primarily upon evidence of a prospective member's scholarly contributions to the vascular surgery literature.

1. Active Members:

- a. Application forms presenting the curriculum vitae of the candidates and signed by them and the sponsor shall be in the hands of the Secretary-Treasurer at least four (4) months before the Executive Session at which it is desired that the candidate be considered for election. Applications must be supported by a letter from the sponsor. Additional letters of recommendation from two other members are desirable.
- b. The Secretary-Treasurer shall send to the Chairman of the Membership Committee these applications with all pertinent data, including supporting letters, at least three (3) months before the annual meeting. The Membership Committee shall review the professional qualifications of the candidates.
- c. The list of candidates with data concerning them shall be circulated by the Secretary-Treasurer to all members of the Society at least two (2) months before the annual meeting.
- d. The Membership Committee shall meet prior to the annual meeting to review the applications and to make recommendation for membership. The Chairman of the Membership Committee shall meet with the Council for purposes of presenting recommendations of the Membership Committee for review by Council before presenting recommendations to the membership at large at the time of the annual meeting.
- e. The names of Candidates recommended by the Council for election shall be submitted by the Secretary-Treasurer to the membership in the annual

report at the Executive Session of the Society.

- f. Election to membership shall be by secret ballot, by a three-fourths affirmative vote of the membership present and voting at the annual Executive Session.
 - g. A candidate who fails election at one meeting may be presented for consideration of membership at a subsequent meeting by repeating the above process.
2. **Honorary Members:**
- a. Any active or senior member may nominate an individual for membership. The name and brief description of the accomplishments of the nominee must be submitted to the Secretary-Treasurer at least six (6) months prior to the annual meeting for circulation to an Honorary Membership Committee which consists of the three (3) past presidents on the Council.
 - b. The Honorary Membership Committee shall make its recommendations to the Council.
 - c. Following its deliberation, the Council may recommend that the candidate's name be submitted by the Secretary-Treasurer to the membership in the annual report presented at the Executive Session of the Society.
 - d. Election to membership shall be by secret ballot, by a three-fourths affirmative vote of the membership present and voting at the annual Executive Session.
3. **Associate Members:**
- a. Any member in good standing, who leaves the geographic area of the Western Vascular Society, may request transfer in status to associate membership. If a member fails to request such transfer he will automatically be dropped from the membership roster.
4. **Adjunct Members:**
- a. The process of election shall be the same as for active members.

**ARTICLE V – BOARD OF DIRECTORS
 (“COUNCIL”)**

1. The Board of Directors of the Society shall be called the Council.
2. The Council shall be composed of the President, the President-Elect, the Secretary-Treasurer, the Recorder, and the three (3) most recent available past presidents.
3. The Council shall be the governing body of the Society and shall have full power to manage and act on all affairs of the society except as follows:
 - a. It may not without the approval of the Society membership at an annual executive session alter the initiation fees or annual dues, or levy any assessments against the membership, except that it may, in individual cases, waive annual dues or assessments.
 - b. It may not amend the Articles of Incorporation or Bylaws.
 - c. It may neither elect new members nor alter the status of existing members, other than to apply the provisions of Article XI.
4. The President of the Society shall serve as Chairman of the Council and the Secretary-Treasurer of the Society as its Secretary.
5. Meetings of the Council shall be held at the call of the President of the Society, and each member of the Council must be notified in writing of the time and place of each such meeting no less than ten (10) days prior to meeting.
6. The annual meeting of the Council shall precede the Executive Session of the Society membership.
7. A majority of the voting members of the Council shall constitute a quorum for the transaction of business.
8. The act of a majority of the members of the Council present at a duly called meeting at which a quorum is present shall be the act of the Council, unless the act of a greater number of required by applicable statute, the Articles of Incorporation or these Bylaws.
9. Any action which is required by law or the Articles of Incorporation or these Bylaws to be taken at a meeting of the council, or any other action which may be taken at a meeting of the Council, may be taken without a meeting if a consent in writing, setting forth the action taken, shall be signed by all the members of the Council entitled to vote with respect to the subject matter thereof. Any consent signed by all the members of the Council shall have the same force and effect as a unanimous vote of a duly called and constituted meeting of the Council.

ARTICLE VI – OFFICERS

1. The Officers of the Society shall be a President, a President-Elect, a Secretary-Treasurer, and a Recorder, all to be elected as provided in these Bylaws. Said officers shall serve ex-officio as voting members of the Council.
2. All Officers of the Society shall be elected for terms of one (1) year each. The President may not serve more than one (1) term.
3. Officers of the Society shall be nominated by the Nominating Committee which shall present the slate to the membership at the Executive Session of the annual meeting. Additional nominations may be made from the floor of the Executive Session each year. The election shall take place at the Executive Session and election shall be by a majority of the votes cast.
4. The President shall preside at meetings of the Society and the Council, preserve order, regulate debates, announce results of elections, appoint committees not otherwise provided for, sign Certificates of Membership, and perform the duties of the President's office.
5. The President-Elect, in the absence or incapacity of the President, shall perform the duties of the President's office.
6. In the absence of both the President and the President-Elect, the Chair shall be taken by a Chairman Pro Tem, elected by such members of the Council as are present.
7. The Secretary-Treasurer shall keep the minutes of the meetings of the Society and Council, attest all official acts requiring certification; notify officers and members of their election; keep in his custody the seal of the Society and affix it to all appropriate documents; conduct correspondence; take charge of all papers not otherwise provided for. At least thirty (30) days but not more than forty (40) days prior to each annual or special meeting he shall issue to all members of the Society a program of the forthcoming meeting. He shall compile a written report to be read at the annual Executive Session of the Society, in which shall be included a list of candidates proposed for membership, as approved by Council. He shall receive all moneys and funds belonging to the Society; pay all bills; render bills for dues and assessments as soon as possible after the annual meeting; and report to the Council at each annual meeting the names of all members in arrears as to dues. He shall prepare a written report of the finances of the Society to be presented at the Council Meeting and at the Executive Meeting.
8. The Historian shall serve a one-year term and will be appointed by the President. It shall be the duty of the Historian to assemble and preserve the Archives of the Society for storage and reference. The archives shall consist of the roster of the members of the society since its inception and such photographs as are available. It shall be his/her duty to secure and file a

photograph of each new member. At the request of the President, the Historian may be asked to provide an appropriate historical comment at either the executive session or the regular meeting. The records of the Western Vascular Society are preserved at the UCLA Medical Center by the archivist of the Louise Darling Library.

9. The Recorder shall receive all papers and reports of discussions on papers presented before the Society. The Recorder, together with the Program Committee, shall review all manuscripts and provide an editorial comment to accompany manuscripts when submitted to the Editorial Board of the Journal in which manuscripts are to be considered for publication.

ARTICLE VII – COMMITTEES

1. Standing committees of the Society shall consist of a Membership Committee, a Nominating Committee, a Program Committee, and a Local Arrangements Committee for the annual meeting.
2. The Membership Committee shall consist of three (3) members who shall be appointed by the President to serve overlapping terms of three (3) years each. The Secretary-Treasurer shall be an ex officio member of the membership committee. The senior member in service on this Committee shall be the Chairman. The functions of the Committee shall be to pass upon the professional and ethical qualifications of the applicants and to advise the membership of these recommendations.
3. The Nominating Committee shall consist of the three (3) most recent available past Presidents. The Committee shall be appointed by the President one (1) month before the annual meeting. Its function shall be to make up a slate of officers to be presented at the annual business meeting to the membership.
4. The Program Committee shall consist of four (4) members who shall be appointed by the President to serve overlapping terms of four (4) years each. The senior member in term of service on this Committee shall be the Chairman and will also serve as the Moderator of the Resident Forum. The President, President-Elect, Secretary-Treasurer and Recorder shall be ex officio members of the Program Committee. The function of the Program Committee shall be to solicit presentations from members and other individuals and to make up the program for the annual meeting. The appointed members of the Program Committee shall serve as an advisory committee to act, with the Recorder, to provide editorial review of the submitted manuscripts.
5. The Chairman of the Local Arrangements Committee for the annual meeting shall be appointed by the President and the members of the Committee shall be appointed by the Chairman. These individuals will

consist of members resident in the general locality in which the annual meeting is to be held, together with the President, the Secretary-Treasurer, acting ex officio. The function of this Committee shall be the making of the general arrangements for the annual meeting.

6. The Council may from time to time establish such other Committees as it deems advisable. Each such Committee shall consist of such persons and shall have such duties and powers as may be designated by the Council upon establishment of the Committee from time to time thereafter. Unless otherwise provided by the Council, the President shall appoint the members of each such Committee.
7. Any vacancy occurring among the members of any elected Committee of the Society shall be filled by appointment by the President, the Appointee to serve until the next annual meeting of the Society membership.

ARTICLE VIII – MEETINGS

1. The annual meeting of the Society shall be held at a time and place to be determined by the Council at least one year in advance.
2. The Council shall meet on the day prior to the annual meeting, at a time and place designated by the President. The Chairmen of the Membership Committee, the Nominating Committee and the Local Arrangements Committee shall meet with the Council in an advisory capacity.
3. Twenty (20) voting members present in person shall constitute a quorum at a meeting of the membership.
4. The vote of a majority of the votes entitled to be cast by the members present at a duly called meeting at which a quorum is present shall be necessary for the adoption of any matter voted upon by the members, unless a greater proportion is required by the applicable statute, the Articles of Incorporation, or the Bylaws.
5. Members may not cast their votes by proxy.
6. The Executive Session of the Society, attendance at which shall be limited to active, senior and honorary members, shall be held at a time and place to be set by the President. The business of the Society shall be conducted at that time.
7. The scientific session of the annual meeting shall consist of presentations of papers and the discussion of these papers. An active or senior member must be a participant, co-author or sponsor of each presentation selected.
8. Special meetings of the Society may be called at any time by the President. The President must call a special meeting whenever he is requested to do so in writing by ten (10) members of the Society in good standing.
9. Notice of any Executive Session of any annual or special meeting of the Society shall be given to each member of the Society not less than thirty

(30) nor more than forty (40) days prior to the Executive Session by written or printed notice delivered personally or by mail, by or at the direction of the Council, the President or the Secretary -Treasurer. Such notice shall state the place, day and hour of the Executive Session and in the case of a special meeting shall also state the purpose or purposes for which the Executive Session is called.

10. The Council may, by majority vote, revoke the membership of any active member who shall have been absent from three (3) consecutive meetings of the Society without providing the Secretary-Treasurer with an acceptable written explanation of such absence. An active member shall receive a warning letter from the Secretary-Treasurer following two (2) consecutive unexcused absences from the annual meetings, and the Secretary-Treasurer shall, within thirty (30) days after revocation of any active membership pursuant to this section, send written notice of such action to the individual whose active membership has been so revoked. In addition, in order to emphasize the importance of scholarly participation, it shall be the requirement for each member to be a named author of at least one abstract during a four year term or to be a named discussant of a paper selected for presentation. An active member shall receive a warning letter from the Secretary-Treasurer following three (3) consecutive years in which the member has failed to participate as described above. The Secretary-Treasurer shall, within thirty-(30) days after revocation of active membership pursuant to this section, send written notice of such action to the individual whose active membership has been so revoked. Any person whose active membership has been revoked by the Council pursuant to this section may, within six (6) months after such revocation, send to the Secretary-Treasurer a written request that the Council at its next meeting reconsider its decision. Such a request must be accompanied by a written statement for the reasons for the consistent absence or lack of participation from annual meetings of the Society. If the Council, upon reconsideration, determines by a majority vote that reinstatement is appropriate, the individual shall be reinstated as an active member upon payment in full of any outstanding dues or other financial obligations to the Society, including any such obligations which may have arisen during the period in which the revocation was in effect.

ARTICLE IX – INVITED GUESTS

1. A member of the Society may invite one or more guest(s) to attend the Annual Meeting of the Society. Should a member wish to tender an invitation, formal request must be made to the Secretary-Treasurer to send a written invitation to the individual identified by the member. No guest

will be admitted to the scientific sessions and/ or social events without a formal invitation and active registration.

2. The names of all guests attending the Annual Meeting shall be entered under a separate heading in the attendance list.
3. All invited guests shall be given the privilege of the floor by the President but shall not be present at the Executive Session.

ARTICLE X – FEES AND DUES

1. Initiation fees, dues and assessments shall be levied by the Council and approved by the membership at the annual Executive Session.
2. Any member of the Society in arrears as to dues for one (1) year shall be notified of that fact by the Secretary-Treasurer, by registered letter, which shall contain a copy of this Section 2. If the dues are not paid before the next annual Council meeting, or some reasonable explanation of the delinquency is not forthcoming, the name of the delinquent member shall be presented at the Council meeting and on a majority vote of the Council the name may be stricken from the membership list. The Council may reinstate the delinquent member upon payment of the dues in arrears.

ARTICLE XI – RESIGNATIONS AND DISCIPLINE

1. Resignation of members not in arrears as to dues may be accepted at any annual meeting of the Society by a majority vote of the members present.
2. Charges of unprofessional or unethical conduct may be brought against any member of the Society by a written complaint signed by three (3) members of the Society and delivered to the Secretary-Treasurer. The rules governing disciplinary proceedings based upon such charges shall be established from time to time by the Council.

ARTICLE XII – PAPERS AND REPORTS

1. All papers and reports read before the Society shall be delivered to the Recorder at the time of their presentation.
2. No paper shall be published as having been read before the Society unless it has been read before the Society.

ARTICLE XIII – PROCEDURE

The proceedings of the Society shall be conducted under Roberts Rules of Order Newly Revised.

ARTICLE XIV – CERTIFICATE OF MEMBERSHIP

Every elected member of the Society shall be entitled to a Certificate of Membership signed by the President and the Secretary-Treasurer and bearing the seal of the Society.

ARTICLE XV – SEAL

This Society shall make, have, and use a seal bearing the name of the Society, the words “Corporate Seal, California,” and such other device and description as the Society shall deem proper.

ARTICLE XVI – NOTICE AND WAIVER OF NOTICE

1. Whenever, under applicable law, these Bylaws, or resolution of the Council, notice is required to be given to any member, Council member or Officer, such notice may be given in writing, by mail, addressed to such member, Council member or Officer, at his or her address as it appears on the records of the Society. Such mailed notice shall be deemed to be given when deposited in the United States Mail in a sealed envelope so addressed, with postage therein prepaid.
2. Whenever, under applicable law, these Bylaws, or resolution of the Council, any notice is required to be given, a waiver thereof in writing, signed by the person or persons entitled to such notice. Whether before or after the time stated therein, shall be deemed equivalent to the giving of such notice. In addition, the attendance of a member or Council member at any meeting shall constitute a waiver of notice of such meeting, except where an individual attends the meeting for the express purpose of objecting to the transaction of any business because the meeting is not lawfully called or convened.

ARTICLE XVII – INDEMNIFICATION

1. To the full extent in accordance with the procedure prescribed by the General Not-For-Profit Corporation Act, the Society shall indemnify any and all members of the Council (which members shall hereinafter in this Article be referred to as “Directors”) and any and all officers, employees, agents and representatives of the Society for certain expenses and other amounts paid in connection with legal proceedings in which any such person become involved by reason of their serving in any such capacity for the Society.
2. Upon specific authorization by the Council, the Society may purchase and maintain insurance on behalf of any or all Directors, Officers, employees, agents or representatives of the Society against any liability asserted against

any such person and incurred in any such capacity, or arising out of the status of serving in any such capacity, whether or not the Society would have the power to indemnify them against such liability under the provisions of Section 1 of this Article.

ARTICLE XVIII – AMENDMENT

These Bylaws may be amended by a three-fourths vote of the members present and voting at a properly called and convened Executive Session at an Annual or Special Meeting of the Society, provided that the proposed Amendment has been submitted to the Secretary-Treasurer by at least three (3) voting members of the Society at least three (3) months prior to the Executive Session of the Society. The Secretary-Treasurer shall mail the proposed Amendment at least thirty (30) days prior to the Executive Session, accompanied by notice that such Amendment will be acted upon that Executive Session.

ARTICLE XIX – RULES AND REGULATIONS

The Society may enact from time to time rules and regulations that will govern the actions of the Society. Such Rules and Regulations shall be enacted, amended or deleted by a majority (>50%) vote of those attending the annual business meeting. Proposed rules and regulations require notification of the membership no less than 30 days prior to the annual meeting. Amendments to a proposed Rule and Regulation made at the time of the business meeting may be voted upon at the same business meeting and do not require an additional 30 day notification of members. All Rules and Regulations must be in conformity with the bylaws of the Society.

Amended September 2010