



Western Vascular Society

29th Annual Meeting | September 20-23, 2014

Loews Coronado Bay Resort
Coronado, CA

Table of Contents

Officers & Committees	02
Past Meetings.....	03
Past Secretaries-Treasurers & Recorders	04
New Members Elected In 2013.....	05
WVS Presidential Guest Lecturers.....	05
Schedule of Events	06
Acknowledgements.....	08
General Information	09
Instructions To Authors.....	11
Scientific Program.....	12
Scientific Session Abstracts.....	27
Constitution & Bylaws	95
Membership Roster	107
Member Update Form	131

www.vascularweb.org/wvs

OFFICERS & COMMITTEES

OFFICERS

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

PROGRAM COMMITTEE

Jason T. Lee, MD, *Chair*
David A. Rigberg, MD
Daniel M. Ihnat, MD
Niten Singh, MD
Peter M. Schneider, MD, *President (Ex-Officio)*
Larry A. Kraiss, MD, *President-Elect (Ex-Officio)*
E. John Harris, MD, *Secretary-Treasurer (Ex-Officio)*
York N. Hsiang, MB, MHSc, *Secretary-Treasurer-Elect (Ex-Officio)*
Benjamin W. Starnes, MD, *Recorder (Ex-Officio)*

MEMBERSHIP COMMITTEE

Carlos E. Donayre, MD, *Chair*
Erica L. Mitchell, MD
Thomas F. Rehring, MD
E. John Harris, Jr., MD, *Secretary-Treasurer (Ex-Officio)*
York N. Hsiang, MB, MHSc, *Secretary-Treasurer-Elect (Ex-Officio)*

WVS REPRESENTATIVE TO THE SVS

Peter A. Schneider, MD

LOCAL ARRANGEMENTS COMMITTEE

Scott E. Musicant, 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

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

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 2013

Dennis F. Bandyk, MD
Joseph A. Davis, MD
Brian L. Ferris, MD
Robert E. Noll, MD
Gale L. Tang, MD
Karen Woo, MD

WVS PRESIDENTIAL GUEST LECTURERS

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

SCHEDULE OF EVENTS

Except for the Sunday evening special reception at the San Diego Maritime Museum and the Berkeley, all events will be held at the Loews Coronado Bay. The scientific sessions and exhibits will be held in the Commodore Ballroom (1st floor). Registration will be located in the foyer near the ballroom.

SATURDAY, SEPTEMBER 20, 2014

- 1:00 pm - 4:00 pm **Executive Council Meeting**
(Executive Council & Committee Chairs)
- 6:00 pm - 7:30 pm **WELCOME RECEPTION**

SUNDAY, SEPTEMBER 21, 2014

- 7:15 am - 7:45 am **Continental Breakfast With Educational Exhibitors**
- 7:45 am - 8:00 am **Call To Order & Announcements**
Peter A. Schneider, MD, *President*
- 8:00 am - 9:30 am **SCIENTIFIC SESSION I**
- 10:00 am - 11:00 am **PRESIDENTIAL GUEST LECTURE**
Alan B. Lumsden, MD, ChB, RVT
- 11:00 am - 12:30 pm **SCIENTIFIC SESSION II**
- 12:30 pm - 2:30 pm **LUNCHEON SYMPOSIUM**
Radiation and RPVI

MONDAY, SEPTEMBER 22, 2014

- 7:30 am - 8:00 am **Continental Breakfast With Educational Exhibitors**
- 8:00 am - 9:30 am **SCIENTIFIC SESSION III**
- 10:00 am - 11:10 am **SCIENTIFIC SESSION IV**
- 11:10 am - 11:45 am **PRESIDENTIAL ADDRESS**
Peter A. Schneider, MD

11:45 am - 12:20 pm	WVS Business Meeting
12:00 pm - 2:00 pm	LUNCHEON SYMPOSIUM Hemodialysis and Closure New Technology
4:00 pm - 5:30 pm	TRAINEE SYMPOSIUM Job Search Satisfaction and Tips and Tricks For Trainees
6:00 pm - 8:30 pm	SPECIAL RECEPTION Steam Ferry Berkeley, San Diego Maritime Museum <i>Transportation will depart the Loews Coronado Bay starting at 5:30 pm.</i>

TUESDAY, SEPTEMBER 23, 2014

7:00 am - 7:30 am	Continental Breakfast With Educational Exhibitors
7:30 am - 9:00 am	SCIENTIFIC SESSION V
9:30 am - 11:30 am	SCIENTIFIC SESSION VI
11:30 am	Meeting Adjourns

ACKNOWLEDGEMENTS

The Western Vascular Society wishes to thank the following companies for their educational grants in support of the 29th Annual Meeting:

Cook Medical

GENERAL INFORMATION

EDUCATIONAL OBJECTIVES & METHODS

The 29th 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. For a copy of the full Preliminary Program, please visit the 2014 Annual Meeting page at www.vascularweb.org/wvs.

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

1. Better understand the current treatment for peripheral vascular disease and diabetic limb salvage
2. Better understand diagnostic ultrasound principles and be prepared for the RPVI examination
3. Better understand the relative benefits of physician modified, off the shelf fenestrated, and snorkel techniques for juxtarenal endovascular aneurysm repair
4. Understand the predictors of successful hemodialysis access creation
5. Understand the role of carotid artery stenting and carotid endarterectomy and risk factors for post procedural issues
6. Understand the need for preoperative cardiac stress testing prior to vascular interventions
7. Better understand surveillance issues after endovascular aneurysm

GENERAL INFORMATION

EDUCATIONAL METHODS

Authored papers are supported by PowerPoint presentations. Papers have a primary discussant and ample time provided for questions and discussion from the audience. Panel and group discussions are encouraged.

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.

ACCREDITATION STATEMENT

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 sponsorship 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 for physicians.



AMA PRA CATEGORY 1 CREDITS™

The American College of Surgeons designates this live activity for a maximum of 16.25 *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 16.25 credits meet the requirements for Self-Assessment.

INSTRUCTIONS TO AUTHORS

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

Full Presentations: Eight (8) minutes, followed by an invited discussion, rebuttal and general discussion.

Mini Presentations: Presentations are limited to four (4) minutes, followed by general discussion.

Invited Discussion: Two (2) minutes to specifically critique the paper as presented. Visual aids may be not 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.

Manuscripts: Authors of **full presentations** are **required** to submit a manuscript of their presentation for possible publication in the *Journal of Vascular Surgery*. We encourage authors of all other presentations to also submit a manuscript to the *Journal*. The guidelines for submission of your manuscript (s) may be found on the *Journal of Vascular Surgery's* website. Please refer to the Guidelines For Initial Electronic Manuscript Submission and the Instructions For Authors. Authors should submit their manuscript to the *JVS* prior to the meeting. Note that the only information to be placed in the keywords section is the abbreviation of the Society and year. 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 **ballroom foyer** and open during the following hours:

Saturday, September 20	4:00 pm – 8:00 p.m
Sunday, September 21	7:00 am – 2:00 pm
Monday, September 22	7:00 am – 2:00 pm
Tuesday, September 23	7:00 am – 11:00 am

MESSAGING AND TELEPHONE USAGE

During the Scientific Sessions, we ask meeting participants to turn off their electronic devices or set their devices to vibrate during the Scientific Sessions. If a meeting participant cannot be reached through his/her cellular telephone or pager, the Hotel's telephone number may be used to reach the WVS Registration Desk where messages may be posted.

SCIENTIFIC PROGRAM

SUNDAY, SEPTEMBER 21, 2014

- 7:15 am - 7:45 am **Continental Breakfast With Educational Exhibitors**
- 7:45 am - 8:00 am **Call To Order & Announcements**
Peter A. Schneider, MD, *President*
- 8:00 am - 9:30 am** **SCIENTIFIC SESSION I**
Presiding: Peter A. Schneider, MD & Benjamin W. Starnes, MD
- 8:00 am - 8:20 am §1
The Effect of P27^{kip1} on Arterial Remodeling in Response to Hindlimb Ischemia
Galit Ankri- Eliahoo, PhD, Kevin Weitz, Gale Tang, MD - Surgery, University of Washington, Seattle, WA
Discussant: David A. Rigberg, MD
- 8:20 am - 8:40 am 2
The Impact of Vein Harvesting Technique on Wound Complications and Graft Patency After Infra-Inguinal Arterial Bypass
Pedro G. Teixeira, MD, Karen Woo, MD, MPH, Fred Weaver, MD, MMM, Vincent L. Rowe, MD, MMM - University of Southern California, Los Angeles, CA
Discussant: Gregory J. Landry, MD
- 8:40 am - 9:00 am §3
Objective Indocyanine Green Angiographic Criteria Using Ingress and Ingress Rate to Detect SVS Lower Extremity Threatened Limb Classification (Wifl) Grade 3 Ischemia
Jonathan D. Braun, MD, Pooja Rajguru, David G. Armstrong, MD, DPM, PhD, Joseph L. Mills, MD - University of Arizona, Tucson, AZ
Discussant: Michael S. Conte, MD

- 9:00 am - 9:20 am §4
Intra-Operative Completion Imaging Does Not Improve Primary Patency for Lower Extremity Bypass: A Vascular Quality Initiative Analysis
Owen P. Palmer, MD, Vincent L. Rowe, MD, Fred A. Weaver, MD, Karen Woo, MD - University of Southern California, Los Angeles, CA
Discussant: Joseph A. Davis, MD
- 9:20 am - 9:30 am 5
Presentation of Symptomatic PAD in Patients with Chronic HIV Infection
Shant M. Vartanian, MD, Sukgu M. Han, MD, Bian Wu, MD, Warren J. Gasper, MD, Christopher D. Owens, MD, Michael S. Conte, MD - University of California, San Francisco, San Francisco, CA
- 9:30 am - 10:00 am **Coffee Break With Educational Exhibitors**
- 10:00 am - 11:00 am** **PRESIDENTIAL GUEST LECTURE**
Pumps and Pipes: The Other Guy's Tool Kits and What We Can Learn
Alan B. Lumsden, MD, ChB, RVT
Houston Methodist Cardiovascular Associates
Methodist DeBakey Heart and Vascular Center
Houston, Texas
- 11:00 am - 12:30 pm** **SCIENTIFIC SESSION II**
Presiding: Peter A. Schneider, MD & Benjamin W. Starnes, MD
- 11:00 am - 11:20 am §6
Geometry and Respiratory-Induced Deformation of Abdominal Branch Vessels Following Complex EVAR
Brant W. Ullery, MD, Ga-Young Suh, PhD, Jason T. Lee, MD, Brian Liu, BS, Robert Stineman, Ronald L. Dalman, MD, Christopher P. Cheng, PhD - Stanford University, Stanford, CA
Discussant: Benjamin W. Starnes, MD

- 11:20 am - 11:40 am 7
Zenith p-Branch Fenestrated Endovascular Graft: How Close “Off-the-Shelf” Repair for Asian Patients with Juxtarenal Aortic Aneurysms?
Jiale OU¹, Stephen WK Cheng² - ¹Surgery, The University of Hong Kong, Hong Kong, China; ²The University of Hong Kong, China
Discussant: William J. Quinones-Baldrich, MD
- 11:40 am - 12:00 pm 8
Initial Experience with Endovascular Treatment of Thoraco-Abdominal Aortic Aneurysm Using Physician Modified Endografts: B-TEVAR IDE Study
Matthew P. Sweet, MD, Benjamin W. Starnes, MD, Billi Tatum, RN, CRCC - University of Washington, Seattle, WA
Discussant: Stephen W. K. Cheng, MD
- 12:00 pm - 12:10 pm 9
Physician Modified Endovascular Grafts: Graft Creation
Benjamin W. Starnes, MD, Gale Tang, MD, Billi Tatum, RN - Surgery, University of Washington, Seattle, WA
- 12:10 pm - 12:20 pm 10
The Impact of Endovascular Repair (EVAR) of Abdominal Aortic Aneurysms (AAA) on Resident Training in Elective Open Aneurysm Repair
Michael P. Harlander-Locke, MPH, Peter F. Lawrence, MD, William Quinones-Baldrich, MD, Wesley S. Moore, MD - University of California Los Angeles, Los Angeles, CA
- 12:20 pm - 12:30 pm **Q & A**

12:30 pm - 2:30 pm	LUNCHEON SYMPOSIUM Radiation and RPVI
12:30 pm - 12:40 pm	Introduction/Symposium Overview
12:40 pm - 1:00 pm	Basics of Radiation Safety John S. Lane, III, MD Director, Endovascular Surgery, UCSD Chief, Vascular Surgery, La Jolla VA Hospital University of California, San Diego La Jolla, CA
1:00 pm - 1:20 pm	Reducing Exposure: Utilizing Equipment Andrew Barleben, MD, MPH Associate Professor, Department of Surgery, Division of Vascular Surgery, University of California, San Diego Staff Surgeon, Department of Surgery, Division of Vascular Surgery, VA San Diego, San Diego, CA
1:20 pm - 1:40 pm	Reducing Exposure: Maximizing Technique Jane Kim Yang, MD Assistant Professor UCLA/Olive View Medical Center Los Angeles, CA
1:40 pm - 1:55 pm	What You Need to Know for RPVI Dennis F. Bandyk, MD Chief of Vascular Surgery University of California, San Diego School of Medicine La Jolla, CA
1:55 pm - 2:10 pm	Vascular Ultrasound Principles Ankur Chandra, MD Associate Professor of Surgery and Biomedical Engineering University of Rochester School of Medicine and Dentistry Rochester, NY
2:10 pm - 2:30 pm	Panel Discussion and Q&A
2:30 pm	Adjourn

4:00-5:30 pm **TRAINEE SYMPOSIUM**
Job Search Satisfaction and Tips and Tricks for
Trainees

MONDAY, SEPTEMBER 22, 2014

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

8:00 am - 9:30 am **SCIENTIFIC SESSION III**
Presiding: Larry W. Kraiss, MD & Benjamin W.
Starnes, MD

8:00 am - 8:20 am 11
Brachial Artery Volume Flow by Duplex
Predicts Dialysis Access Maturation
Dennis F. Bandyk, MD¹, Sae Hee Ko, MD², Kelley
Hodgkiss-Harlow, MD³, John Lane, III, MD²,
Andrew Barleben, MD² - ¹Vascular &
Endovascular Surgery, Univ. of California - San
Diego, La Jolla, CA; ²Univ. of California - San
Diego, La Jolla, CA; ³Kaiser Permanente - San
Diego, La Jolla, CA
Proposed Discussant: TBD

8:20 am - 8:30 am 12
Migration towards Proximal Location Improves
Maturation Rate of Arteriovenous Fistula
Edward D. Gifford, MD, Virginia Nguyen, BS,
Amy H. Kaji, MD, PhD, Patrick Chisum, BS,
Jerry Kim, MD, Annie Zeng, Ramanath
Dukkipati, MD, Christian deVirgilio, MD -
Surgery, Harbor-UCLA Medical Center, Torrance,
CA

8:30 am - 8:40 am 13
Intraoperative Evaluation is Superior to
Preoperative Venous Mapping in Predicting
Arteriovenous Fistula Success
Khanh P. Nguyen, MD, Theodore Teruya, MD,
Neha Sheng, MD, Olamide Alabi, MD, Jason
Chiriano, DO, Christian Bianchi, MD, Salem
Dehom, MPH, Ahmed Abou-Zamzam, MD -
Loma Linda University Medical Center, Loma
Linda, CA

- 8:40 am - 8:50 am 14
Utilization of Venous Duplex Scanning and Postoperative Venograms in Patients with Subclavian Vein Thrombosis
Megan S. Orlando, Kendall C. Likes, Ying Wei Lum, MD, Julie A. Freischlag, MD - Johns Hopkins Medical Institutions, Baltimore, MD
- 8:50 am - 9:10 am §15
Carotid Stent Performance: Experience Matters More Than Specialty
Michael D. Sgroi, MD¹, Nii-Kabu Kabutey, MD¹, Andrew R. Barleben, MD², John S. Lane, III, MD², Roy M. Fujitani, MD¹ - ¹University of California, Irvine, Orange, CA; ²University of California, San Diego, San Diego, CA
Discussant: Ronald L. Dalman, MD
- 9:10 am - 9:30 am §16
Predictors and Consequences of Hemodynamic Instability Following Carotid Artery Stenting
Tiffany Y. Wu, MD¹, Sung W. Ham, MD², Steven G. Katz² - ¹Huntington Hospital, Pasadena, CA; ²USC Surgeons, Pasadena, CA
Discussant: Michael T. Caps, MD
- 9:30 am - 10:00 am **Coffee Break With Educational Exhibitors**

10:00 am - 11:45 am

SCIENTIFIC SESSION IV

Presiding: Larry W. Kraiss, MD & Benjamin W. Starnes, MD

10:00 am - 10:20 am

17

Cranial Nerve Injury (CNI) in the Carotid Revascularization Endarterectomy versus Stenting Trial (CREST): Incidence, Outcomes and Quality of Life

Robert J. Hye, MD¹, Ariane Mackey, MD², Jenifer Voeks, PhD³, David J. Cohen, MD⁴, Kaijun Wang, PhD⁴, MeeLee Tom, MS⁵, Thomas G. Brott, MD^{6,5}
- ¹Kaiser Permanente, San Diego, CA; ²HÃpital de l'Enfant-JÃsus, Quebec, QC, Canada; ³Medical University of South Carolina, Charleston, SC; ⁴St. Luke's Hospital, Kansas City, MO; ⁵Rutgers University, Newark, NJ; ⁶Mayo Clinic, Jacksonville, FL

Discussant: John S. Lane, III, MD

10:20 am - 10:40 am

§18

The Pulseless Limb In War Trauma: Does It Predict An Arterial Injury?

Jacob F. Quail, MD¹, Victoria S. McDonald, MD², Kristina K. Carter, PhD², Jeffrey S. Weiss, MD^{2,3}, Kevin Casey, MD^{2,3} - ¹General Surgery, Naval Medical Center San Diego, San Diego, CA; ²Naval Medical Center San Diego, San Diego, CA; ³NATO Role III, Multinational Medical Unit, Kandahar, Afghanistan, Afghanistan

Discussant: Niten Singh, MD

10:40 am - 10:50 am

19

Popliteal Artery Trauma: Is There a Standardized Approach To Managing These Patients? Results of a Survey

Elina Quiroga, MD, Niten Singh, MD, Benjamin W. Starnes, MD, Nam T. Tran, MD - University of Washington, Seattle, WA

10:50 am - 11:10 am	§20 What is the Normal Toe Brachial Index? Results from Healthy Young Adults Adrian Fung, Whitney L. Quong, Rollin Y. Yu, York Hsiang, MD - Division of Vascular Surgery, University of British Columbia, Vancouver, BC, Canada <i>Proposed Discussant: TBD</i>
11:10 am - 11:45 am	PRESIDENTIAL ADDRESS The Future of Vascular Surgery Peter A. Schneider, MD
11:45 am - 12:30 pm	WVS Business Meeting
12:30 pm - 2:20 pm	LUNCHEON SYMPOSIUM Hemodialysis and Closure New Technology
12:30 pm - 12:35 pm	Introduction/Symposium Overview
12:35 pm - 12:45 pm	Navigating The Guidelines For Successful AVF Creation - Is It Is Possible To Succeed? Mark R. Nehler, MD Professor of Surgery, the Michael W. Dunaway Chair in Vascular Surgery Chief, Section of Vascular Surgery and Endovascular Therapy and Podiatry University of Colorado, School of Medicine Aurora, CO
12:45 pm - 12:55 pm	Unusual Dialysis Access: Do These Really Work? Ahmed Abou-Zamzam, MD Vascular Surgery Loma Linda University Medical Center Loma Linda, CA
12:55 pm - 1:05 pm	Point Of Care Ultrasound (POC): Can This Assist In Maintaining Patent AVF? Gale L. Tang, MD Assistant Professor of Surgery, UW Harborview Medical Center VA Puget Sound Health Care System Seattle, WA

- 1:05 pm - 1:15 pm **How Small Can The Vein Be For Successful AVF And How Did We Obtain These Numbers?**
Niten Singh, MD
Associate Professor of Surgery
University of Washington
Seattle, WA
- 1:15 pm - 1:25 pm **Percutaneous Access- Historical Perspectives**
David Deaton, MD
Chesapeake Vascular, PC
Crownsville, MD
- 1:25 pm - 1:35 pm **Large Bore Percutaneous Closure - How to Do It Successfully**
Benjamin W. Starnes, MD
Professor and Chief
Division of Vascular Surgery
University of Washington
Seattle, WA
- 1:35 pm - 1:45 pm **Suture Mediated Closure Devices- What Are Tips and Techniques to Avoid Complications**
Brian G. DeRubertis, MD
Assistant Professor of Surgery
Division of Vascular Surgery
David Geffen School of Medicine at UCLA
Los Angeles, CA
- 1:45 pm - 2:00 pm **Non-Suture Mediated Closure Devices- What Is Available?**
Reagan W. Quan, MD
Director, Vascular and Endovascular Surgery
Wellspan Heart and Vascular
York, PA
- 2:00 pm - 2:30 pm **Panel Discussion and Q&A**
- 2:30 pm **Adjourn**

TUESDAY, SEPTEMBER 23, 2014

- 7:00 am - 7:30 am **Continental Breakfast With Educational Exhibitors**
- 7:30 am - 9:00 am** **SCIENTIFIC SESSION V**
Presiding: Larry W. Kraiss, MD & Benjamin W. Starnes, MD
- 7:30 am - 7:50 am 21
Outcomes Following Stent-Graft Therapy of Dissection Related Aneurysmal Degeneration in the Descending Thoracic Aorta
Derek P. Nathan, MD, Sherene Shalhub, MD, Gale L. Tang, MD, Matthew P. Sweet, MD, Edward D. Verrier, MD, Nam T. Tran, MD, Gabriel S. Aldea, MD, Benjamin W. Starnes, MD - University of Washington, Seattle, WA
Discussant: Carlos A. Donayre, MD
- 7:50 am - 8:00 am 22
Staged Hybrid Repair of Combined Ascending/ Descending Thoracic Aortic Aneurysms Using the Frozen Elephant Trunk Technique with the Cook Zenith Tx2 Stent-Graft
Osvaldo Yano, MD, Vicken Melikian, MD, Daniel Pellegrini, MD, Hong T. Hua, MD - Vascular Surgery, Kaiser Permanente San Francisco, San Francisco, CA

8:00 am - 8:20 am

23

Adherence to EVAR Device Instructions-For-Use (IFU) Guidelines Has No Impact on Long Term Outcomes

Joy P. Walker, MD¹, Lue-Yen Tucker², Philip Goodney³, Hong Hua⁴, Steven Okuhn⁴, Ann Rhoades⁵, Bradley Hill⁶, Robert W. Chang⁷ -

¹Vascular and Endovascular Surgery, University of California San Francisco, San Francisco, CA;

²Kaiser Permanente Division of Research, Oakland, CA; ³Dartmouth-Hitchcock Medical Center,

Lebanon, NH; ⁴The Permanente Medical Group, San Francisco, CA; ⁵Kaiser Permanente, Oakland, CA; ⁶The Permanente Medical Group, Santa Clara, CA; ⁷The Permanente Medical Group, South San Francisco, CA

Discussant: Jason T. Lee, MD

8:20 am - 8:30 am

24

Extended Proximal Seal Zone during EVAR Predicts Aneurysm Sac Regression

Zachary M. Arthurs, MD¹, Kenneth Ouriel, MD², M. Burrell Welborn III, MD³, Huey B. McDaniel, MD⁴ - ¹Vascular Surgery, San Antonio Military Medical Center, San Antonio, TX; ²Syntactx, New York, NY; ³Valley Vascular Consultants, Huntsville, AL; ⁴St. Dominic's Cardiovascular Surgical Associates, Jackson, MS

Sponsored by: Benjamin W. Starnes, MD

8:30 am - 8:40 am

25

Endovascular Stent-Graft Repair of Proximal Renal Artery Aneurysms

Venita Chandra, MD, Brant W. Ullery, MD, Jason T. Lee, MD - Stanford University, Stanford, CA

- 8:40 am - 9:00 am 26
Cardiac Stress Testing During Workup for Abdominal Aortic Aneurysm Repair Does Not Improve Patient Outcomes
Benjamin S. Brooke, MD, PhD¹, Yingying Zhang, MS², Tom H. Greene, PhD², Yue Zhang, PhD², Angela Presson, PhD², Larry W. Kraiss, MD¹ -
¹Division of Vascular Surgery, University of Utah School of Medicine, Salt Lake City, UT; ²Division of Epidemiology, University of Utah School of Medicine, Salt Lake City, UT
Discussant: Christian de Virgilio, MD
- 9:00 am - 9:30 am **Coffee Break With Educational Exhibitors**
- 9:30 am - 11:30 am** **SCIENTIFIC SESSION VI**
Presiding: Peter A. Schneider, MD & Benjamin W. Starnes, MD
- 9:30 am - 9:50 am 27
Deterministic Effects Following FEVAR are Less Prevalent Than Expected
Melissa L. Kirkwood, MD, Jeffery Guild, PhD, Gary Arbique, PhD, Carlos Timaran, MD, Jon A. Anderson, PhD, Gregory Modrall, MD, R. James Valentine, MD - Surgery, Division Vascular and Endovascular Surgery, University of Texas Southwestern Medical Center, Dallas, TX
Sponsored by: Fred A. Weaver, MD
Discussant: Brian G. DeRubertis, MD
- 9:50 am - 10:00 am 28
Custom Fenestration Templates for Endovascular Repair of Juxtarenal Aortic Aneurysms
Daniel F. Leotta, PhD¹, Benjamin W. Starnes, MD²
- ¹Applied Physics Laboratory, University of Washington, Seattle, WA; ²University of Washington, Seattle, WA

- 10:00 am - 10:20 am 29
Risk Factors and Outcomes of Post-Operative Ischemic Colitis in Contemporary Open and Endovascular Abdominal Aortic Aneurysm Repair
Zhobin Moghadamyeghaneh, MD, Michael D. Sgroi, MD, Nii-Kabu Kabutey, MD, Michael J. Stamos, MD, Roy M. Fujitani, MD - University of California, Irvine, Orange, CA
Proposed Discussant: TBD
- 10:20 am - 10:40 am 30
The Use of Micro-Oxygen Sensors (MOXYs) to Determine Dynamic Relative Oxygen Indices in the Foot of Patients with Critical Limb Ischemia (CLI) During an Endovascular Therapy: The First-In-Man ‘Si Se Puede’ Study
Miguel Montero-Baker, MD¹, Luis Morelli-Alvarez, MD¹, Kristen Helton, PhD², Kit Yee Au-Yeung, PhD² - ¹San Juan de Dios Hospital, Costa Rica, Costa Rica; ²PROFUSA, Inc., South San Francisco, CA
Sponsored by: Joseph L. Mills, MD
Discussant: Dennis F. Bandyk, MD
- 10:40 am - 11:00 am 31
More Aggressive Anticoagulation/Anti-Platelet Regimen Improves Patency Following Viabahn Stent-grafting of the SFA
Brant W. Ullery, MD, Nathan Itoga, MD, Kenneth Tran, Ronald L. Dalman, MD, Jason T. Lee, MD - Stanford University, Stanford, CA
Discussant: TBD

11:00 am - 11:20 am

32

**A Multiregional Vascular Registry Experience:
Optimization of Data Capture for Longitudinal
Outcomes Surveillance Using an Electronic
Medical Record**

Tazo Inui, MD¹, Robert J. Hye, MD¹, Faith F. Anthony, MA², Mary-Lou Kiley, MBA LCSW², Robert W. Chang, MD³, Thomas F. Rehring, MD⁴, Nicolas A. Nelken, MD⁵, Bradley B. Hill, MD⁶ -
¹Surgery, Kaiser Permanente, San Diego, CA;
²Kaiser Permanente, San Diego, CA; ³Kaiser Permanente, San Francisco, CA; ⁴Kaiser Permanente, Denver, CO; ⁵Kaiser Permanente, Honolulu, HI; ⁶Kaiser Permanente, Santa Clara, CA

Discussant: Fred A. Weaver, MD

11:20 am - 11:30 am

33

**A Randomized Comparison of Specialized
Versus Standard Compression After Saphenous
Vein Ablation**

Mark Meissner, MD¹, Kathy Gibson, MD² -
¹Surgery, University of Washington School of Medicine, Seattle, WA; ²Lake Washington Vascular Surgeons, Bellevue, WA

11:30 am

Meeting Adjourns

NOTES

SCIENTIFIC SESSION ABSTRACTS

SUNDAY, SEPTEMBER 21, 2014

- 7:15 am - 7:45 am **Continental Breakfast With Educational Exhibitors**
- 7:45 am - 8:00 am **Call To Order & Announcements**
Peter A. Schneider, MD, *President*
- 8:00 am - 9:30 am** **SCIENTIFIC SESSION I**
Presiding: Peter A. Schneider, MD & Benjamin W. Starnes, MD
- 8:00 am - 8:20 am §1
The Effect of P27^{kip1} on Arterial Remodeling in Response to Hindlimb Ischemia
Galit Ankri- Eliahoo, PhD, Kevin Weitz, Gale Tang, MD - Surgery, University of Washington, Seattle, WA
Discussant: David A. Rigberg, MD

Objective: The natural response to peripheral arterial occlusive disease secondary to atherosclerosis is enlargement of collateral arteries; however, the molecular factors that control collateralization are not well understood. Recently, a genetic polymorphism was identified in the gene p27^{kip1} (p27), which affects human response to arterial injury. Previous studies have shown that overexpression of p27 inhibits vascular endothelial and VSMC proliferation and angiogenesis. In order to test the hypothesis that p27 affects collateral artery development after ischemia, we performed *in vivo* and *in vitro* experiments using p27^{-/-} mice and wild type (wt) mice.

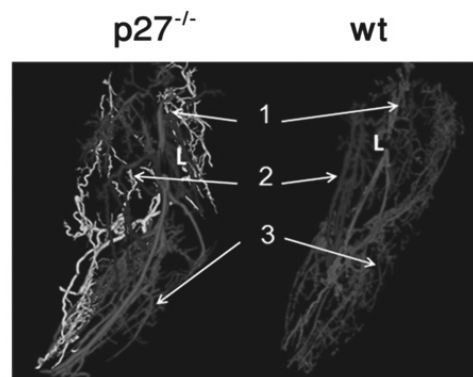
Methods: *In vivo* studies were performed on p27^{-/-} (n=10) and wt (C57BL/6, n=4) female mice. Hindlimb ischemia was induced by left femoral artery ligation. The mice were followed weekly by laser Doppler perfusion imaging of the foot pads until sacrifice at 28 days postoperatively. MicroCT scanning of both hindlimbs was performed after sacrifice. Aortic smooth muscle cells (aoSMC) were isolated from p27^{-/-} and wt mice. Scratch assays to test migration were performed under growth arrest conditions and assessed at 20 hours. A gel contraction assay was also assessed after 20 hours. Statistical analysis was done with student t-tests. All data are presented as mean ± s.e.m.

Results: p27^{-/-} mice reperfused more effectively than wt mice by laser Doppler perfusion imaging starting from day 7 (ischemic/nonischemic ratio 0.33 ± 0.02 vs 0.25 ± 0.02, p < 0.05) and continuing through day 28 (0.45 ± 0.04 vs 0.31 ±

0.04, $p < 0.05$). microCT scanning showed that the diameter of collaterals in the non-ischemic legs for both groups was $\sim 70 \pm 20 \mu\text{m}$. The collateral diameters increased more in p27^{-/-} mice than wt mice ($172 \pm 19 \mu\text{m}$ vs $130 \pm 18 \mu\text{m}$, $p < 0.05$). Figure 1 shows a representative microCT for a ligated p27^{-/-} leg vs a wt leg. p27^{-/-} aoSMC migrated more ($79 \pm 5\%$ vs. $56 \pm 6\%$, $p < 0.05$) and caused more gel contraction ($18 \pm 5\%$ % of the initial area vs $43 \pm 4\%$, $p < 0.05$) than wt aoSMC.

Conclusion: p27^{-/-} mice develop significantly greater collateralization following femoral artery ligation. p27 inhibits collagen gel contraction in addition to inhibiting aoSMC migration. These *in vitro* assays will be used to identify key molecular pathways needed for p27's effect on collateralization.

Figure 1:



**1 - Femoral artery; 2 - Collaterals;
3 - Vessels; L - Ligation**

8:20 am - 8:40 am

2

The Impact of Vein Harvesting Technique on Wound Complications and Graft Patency After Infra-Inguinal Arterial Bypass

Pedro G. Teixeira, MD, Karen Woo, MD, MPH, Fred Weaver, MD, MMM, Vincent L. Rowe, MD, MMM - University of Southern California, Los Angeles, CA

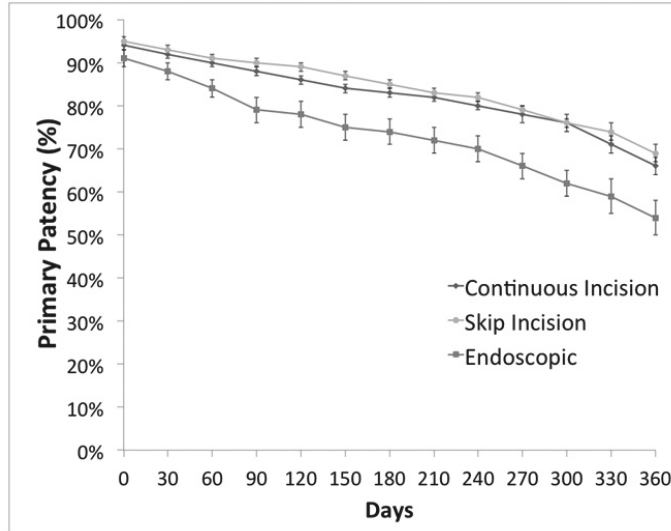
Discussant: Gregory J. Landry, MD

Objective: Investigate the impact of vein harvesting technique (VHT) on wound complications and graft patency after infra-inguinal arterial bypass.

Methods: The Vascular Quality Initiative® (VQI) database was utilized to review vein harvest technique of all patients undergoing single segment greater saphenous vein (GSV) graft infra-inguinal arterial bypass from 2003 to 2013. Patients were assigned to 3 groups according to the VHT used (Continuous incision, Skip incision and Endoscopic). Multinomial logistic regression was performed to estimate group assignment propensity scores. Propensity score adjustment was included in multivariate analysis of surgical site infection (SSI) and graft primary patency.

Results: 5,066 patients underwent single segment GSV graft infra-inguinal bypass. The VHT was continuous incision in 48.6%, skip incision in 39.7% and endoscopic in 12.7%. SSI rates did not differ significantly among the groups (Continuous 4.7%, Skip 4.0%, Endoscopic 3.4%, $p=0.278$). On multivariate analysis, there was no difference in discharge primary patency between the three groups. One-year primary patency rates were 66.2% for Continuous, 68.6% for Skip and 53.9% for Endoscopic, $p<0.001$. After multivariate analysis, endoscopic vein harvest independently increased the risk of one-year primary patency loss compared to Continuous (HR 1.38 [95% CI 1.07-1.77], $p=0.010$). There was no significant difference in one-year primary patency loss between Skip and Continuous. Endoscopic vein harvest also increased the risk of one-year primary patency loss compared to Skip (HR 1.44 [95% CI 1.11-1.87], $p=0.006$) [Figure].

Conclusions: The choice of vein harvest technique had no impact on surgical site infection rates in patients undergoing infra-inguinal arterial bypass in the VQI population. Continuous and skip incisions resulted in equivalent one-year primary patency, but endoscopic vein harvest technique significantly reduced one-year primary patency.



8:40 am - 9:00 am

§3

**Objective Indocyanine Green Angiographic
Criteria Using Ingress and Ingress Rate to
Detect SVS Lower Extremity Threatened Limb
Classification (Wifi) Grade 3 Ischemia**

Jonathan D. Braun, MD, Pooja Rajguru, David G.
Armstrong, MD, DPM, PhD, Joseph L. Mills, MD -
University of Arizona, Tucson, AZ

Discussant: Michael S. Conte, MD

Objective: The evaluation of patients presenting with foot wounds and a spectrum of ischemia has grown more complex. Traditional means of assessing whether blood flow is sufficient for healing are increasingly limited by medial calcinosis, prior toe amputations, and open wounds. We therefore sought to define the utility of Indocyanine Green Angiography (ICGA) as an alternative, objective perfusion assessment not subject to such limitations.

Methods: ICGA uses a charge-coupled camera, a laser and intravenous contrast to assess skin perfusion. From January 2011 to December 2013, we performed ICGA within five days of 57 revascularization procedures in patients with ischemia and tissue loss. ABIs and toe pressures, when available, were compared to multiple, quantitative aspects of ICGA.

Results: 46 patients underwent 57 revascularization procedures (44 Endo, 11 Open and 2 Hybrid) for 48 lower limb wounds (Wifi wound classes 1, 2 and 3 in 32.6%, 52.2% and 15.2%, respectively); 85% were diabetic and 24% were dialysis-dependent. SVS Ischemia classification was not possible in 1/3 of cases due to the inability to obtain standard measurements (65% incompressible ABIs, 41% unable to measure toe pressures). We performed ICGA in all patients and analyzed multiple parameters; both ingress (increase in pixel strength-PxS) and ingress rate (slope of increase in PxS) significantly correlated with available ABIs ($p < .05$). An ingress of 27.3 PxS and ingress rate of 1.1 PxS/sec corresponded to an ABI of 0.4, the cutoff for SVS Wifi Ischemia Grade 3. Post-revascularization, 80% of patients had ingress ≥ 27.3 PxS, 85% had ingress rates ≥ 1.1 PxS/sec, and 100% of those with compressible ABI's post-op had an ABI ≥ 0.4 .

Conclusions: ICGA provides quantitative information about foot perfusion even for patients in whom traditional non-invasive measurements cannot be obtained. We believe this report to be the first to define specific ICGA parameters for detecting severe ischemia (Wifi Ischemia Grade 3) in predominantly diabetic patients with foot wounds and correlating them with standard noninvasive studies. Further study is warranted to refine the use of this technology to appropriately select patients for revascularization and predict wound healing.

9:00 am - 9:20 am

§4

Intra-Operative Completion Imaging Does Not Improve Primary Patency for Lower Extremity Bypass: A Vascular Quality Initiative Analysis

Owen P. Palmer, MD, Vincent L. Rowe, MD, Fred A. Weaver, MD, Karen Woo, MD - University of Southern California, Los Angeles, CA

Discussant: Joseph A. Davis, MD

Objective: To determine the influence of intra-operative completion imaging (CI) for lower extremity vein bypass (LEB) to a below-knee target on primary patency in the Vascular Quality Initiative (VQI).

Methods: The VQI database was queried from January 2003 to October 2013 for LEBs that were elective, had an indication of occlusive disease, used a single-segment greater saphenous vein conduit and had a below-knee target. LEBs with concomitant endovascular procedures were excluded. CI was defined as completion angiography and/or duplex. The endpoints were primary patency at discharge and one year.

Results: 14,284 LEBs were performed during the study period, of which 3,151 satisfied the inclusion/exclusion criteria. 1457 (46%) underwent CI: 287 (20%) duplex, 1116 (77%) angiogram and 54 (3.7%) both. There were more patients in the CI group with a history of smoking and bypass graft crossing the knee (Table 1). Mean procedure time with CI was 274 minutes vs. 244 minutes without CI ($p < 0.0001$). CI did not influence primary patency at discharge (CI 93.2% vs. no CI 93.8%, $p=0.52$). Discharge primary patency for completion duplex was 95.1% vs. 92.8% for completion angiogram ($p = 0.17$). In the CI group, one year primary patency was 63% vs. 68% in the no CI group ($p=0.051$). One year primary patency was 60% for completion duplex vs. 65% for completion angiogram ($p = 0.61$). On univariate and multivariate analysis, CI did not significantly influence primary patency, although multiple other factors were associated with a loss of primary patency (Table 2).

Conclusions: Procedures with intra-operative completion imaging require a mean procedure time of 30 minutes more than procedures without completion imaging. However, completion imaging is not associated with improved discharge or one-year primary patency of elective lower extremity vein bypass grafts with a below-knee target artery performed for occlusive disease.

Table 1. Patient Characteristics

	Completion Imaging (%)	No Completion Imaging (%)	p
n	1457	1694	
Mean age	66.6	67.2	0.12
Male	1031 (71)	1165 (69)	0.25
White race	1238 (85)	1393 (82)	0.06
Hypertension	1294 (89)	1489 (88)	0.57
Diabetes	742 (51)	874 (52)	0.65
End Stage Renal Disease	97 (6.7)	108 (6.4)	0.77
Coronary Artery Disease	458 (31)	478 (28)	0.053
History of Smoking	1217 (84)	1356 (80)	0.02
Previous Ipsilateral Lower Extremity Bypass	154 (11)	185 (11)	0.73
Previous Ipsilateral Lower Extremity Endovascular Intervention	336 (23)	423 (25)	0.2
Tibial/pedal target artery	812 (56)	929 (55)	0.67
Graft crossing the knee	1363 (94)	1536 (91)	0.005

Table 2. Factors Associated with Loss of Primary Patency on Multivariate Analysis (OR - odd ratio, HR - hazard ratio, CI - confidence interval).

Discharge Primary Patency		
	OR	95% CI
Dialysis dependence	1.7	1.1 - 2.7
Previous ipsilateral lower extremity bypass	1.7	1.1-2.5
Tibial/pedal target	1.6	1.1-2.1
One Year Primary Patency		
	HR	95% CI
Female Gender	1.2	1.0-1.5
Previous ipsilateral lower extremity bypass	1.4	1.1-1.8
Previous ipsilateral endovascular intervention	1.3	1.1-1.6
Tibial/pedal target	1.3	1.1-1.5
Graft crossing the knee	1.8	1.2-2.6

9:20 am - 9:30 am

5

Presentation of Symptomatic PAD in Patients with Chronic HIV Infection

Shant M. Vartanian, MD, Sukgu M. Han, MD, Bian Wu, MD, Warren J. Gasper, MD, Christopher D. Owens, MD, Michael S. Conte, MD - University of California, San Francisco, San Francisco, CA

Objective: The enhanced longevity of patients living with chronic HIV infection has resulted in an increased burden of chronic diseases. There is growing evidence that HIV infected patients are at a higher than expected risk of coronary artery disease by 1.5x - 2x. The significance of chronic HIV infection in the peripheral vasculature is largely unknown.

Methods: A retrospective analysis of patients with HIV infection referred for initial consultation to vascular surgery clinics at three teaching hospitals over a 3-year period. Records were reviewed for clinical presentation, comorbid conditions, duration of HIV infection, anti-retroviral treatment history and biochemical profile. Imaging studies were reviewed to localize the distribution of atherosclerosis.

Results: Twenty-seven patients with HIV infection were referred for symptoms related to PAD (21/27, 78%) or extra-cranial cerebrovascular disease (6/27, 22%). The average age was 59.8 years (range 35-74) and 25/27 (93%) were male. Traditional atherosclerosis risk factors were present in varying amounts, including HTN (22/27, 81%), diabetes (8/27, 30%), family history (6/27, 22%) and active smoking (6/27, 22%). The average duration of HIV infection was 18 years (range 11 - 30). Chronic infection was well controlled (mean current CD4+ cell count 554, viral load of <75 copies/uL in 25/27 [93%]). Twenty-six patients were being actively treated with highly active antiretroviral therapy (mean duration 12.5 years) and 23/26 regimens included a nucleoside/nucleotide reverse transcriptase inhibitor. The distribution of atheroma was diffuse, with the femoropopliteal segment most frequently involved (15/27, 56%) followed by aortoiliac disease (12/27, 44%), infra-geniculate disease (9/27, 33%) and carotid bulb disease (6/27, 22%).

Conclusions: Patients with chronic HIV infection can present with clinically significant PAD at a young age. The distribution of disease is diffuse and without a clear predilection for a single pattern of disease. Whether chronic HIV infection accelerates the development of PAD is unknown. The relative contributions of traditional atherosclerotic risk factors, duration of HIV infection and the metabolic effects of pharmacologic treatment are indefinite and warrant further study.

9:30 am - 10:00 am

Coffee Break With Educational Exhibitors

10:00 am - 11:00 am

PRESIDENTIAL GUEST LECTURE

**Pumps and Pipes: The Other Guy's Tool Kits
and What We Can Learn**

Alan B. Lumsden, MD, ChB, RVT

Houston Methodist Cardiovascular Associates

Methodist DeBakey Heart and Vascular Center

Houston, Texas

11:00 am - 12:30 pm

SCIENTIFIC SESSION II

Presiding: Peter A. Schneider, MD & Benjamin W. Starnes, MD

11:00 am - 11:20 am

§6

Geometry and Respiratory-Induced Deformation of Abdominal Branch Vessels Following Complex EVAR

Brant W. Ullery, MD, Ga-Young Suh, PhD, Jason T. Lee, MD, Brian Liu, BS, Robert Stineman, Ronald L. Dalman, MD, Christopher P. Cheng, PhD - Stanford University, Stanford, CA

Discussant: Benjamin W. Starnes, MD

Objective: To quantify geometry and respiration-induced deformation of abdominal branch vessels following fenestrated (F-) and snorkel (Sn-) EVAR.

Methods: 16 patients (75% male; mean age 78 yrs; mean AAA size 68-mm) underwent CT-A during inspiratory and expiratory breath hold protocols postoperatively after F-EVAR (n=7) or Sn-EVAR (n=9). From 3-D models, centerlines were extracted for the aorta and visceral vessels. Branch angles at vessel origins were computed relative to orthogonal configuration. Radius of peak curvature was defined by the circumscribed circle at the highest curvature within the proximal 30-mm of the branch vessel (Fig. 1).

Results: Branch angle, radius of peak curvature, and respiratory deformation for each visceral vessel are noted in the Table. During inspiration, F-renals ($-14^\circ \pm 16^\circ$) were less downward-angled compared to Sn-renals (vs. $-36^\circ \pm 15^\circ$, $P < .005$), unstented celiacs (vs. $-42^\circ \pm 16^\circ$, $P < .0005$), and unstented superior mesenteric arteries (SMAs) (vs. $-32^\circ \pm 17^\circ$, $P < .05$) as shown in Fig. 2. With expiration, the unstented celiac artery angled upwards significantly ($8^\circ \pm 9^\circ$, $P < 0.01$), exhibiting greater magnitude of respiratory change as compared to the F-renals (vs. $0^\circ \pm 5^\circ$, $P < .05$), and Sn-renals (vs. $-1^\circ \pm 6^\circ$, $P < .01$). For inspiration and expiration, the celiac and Sn-renals had lower radius of peak curvature compared to SMAs ($P < .0005$). With expiration, Sn-renals had significant reduction of radius of peak curvature ($P < 0.05$). At a median postoperative follow-up of 14 months (range, 0.3-37), branch vessel patency was 100% and there were 2 reinterventions for type III endoleaks at the main body-left renal artery stent interface.

Conclusion: Sn-renals angled more inferiorly than F-renals due to patient selection and stent configuration. Upward respiratory-induced deformation of the celiac artery exceeded that of stented renals, likely related to lack of intravascular stent placement. Sn-renals exhibited significant curvature change during respiration, a finding which may warrant increased surveillance based on known mechanisms of stent-induced renal artery thrombosis. Further investigation is warranted to better optimize anatomic, patient, and branch

vessel stent type selection between fenestrated and snorkel strategies and their relationship to long-term patency.

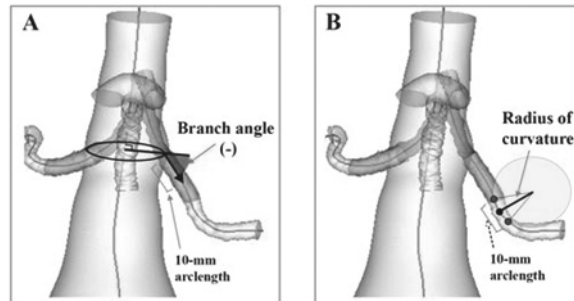


Fig. 1. Quantification of vessel branch angle and radius of curvature. (A) The branch angle was the angle between the orthogonal axis of the abdominal aorta and the vessel vector originated from its ostia on the centerline path and extended by 10-mm arclength. Negative angle indicates downward-directed branching. (B) The radius of peak curvature was defined from the circumscribed circle formed by three points (spanning 10-mm) on the vessel path at the location of peak curvature.

Geometric measurements with inspiration, and respiration-induced changes

Measurement	Celiac (U=16)	SMA (U=13; Sn=3)	Renal (Sn=18; F=12)
Branch angle (Insp, °)	-42 ± 16†	-32 ± 17 (U)‡; -34 ± 14 (Sn)	-36 ± 15 (Sn);** -14 ± 16 (F)†‡***
Δ Branch angle (Exp - Insp, °)	8 ± 9*†	2 ± 7 (U); -1 ± 2 (Sn)	-1 ± 6 (Sn);† 0 ± 5 (F)†
Radius of curvature (Insp, mm)	11 ± 4§	20 ± 8 (U)‡§; 19 ± 2 (Sn)	10 ± 3 (Sn)‡; 14 ± 9 (F)‡
Δ Radius of curvature (Exp - Insp, mm)	-1 ± 3	-2 ± 9 (U); 1 ± 6 (Sn)	-1 ± 2 (Sn)*; -2 ± 6 (F)

Values in mean ± SD. U = unstented, Sn = snorkel, F = fenestrated, Insp = inspiration, Exp = expiration, SMA = superior mesenteric artery. Negative angle indicates downward-directed branching. Positive angle change indicates upward-directed motion. * indicates significant respiratory change (inspiration vs. expiration, P<0.05). ** indicates significant difference between Sn vs. F. †, ‡, § indicate difference between celiac vs. renal, SMA vs. renal, celiac vs. SMA, respectively.

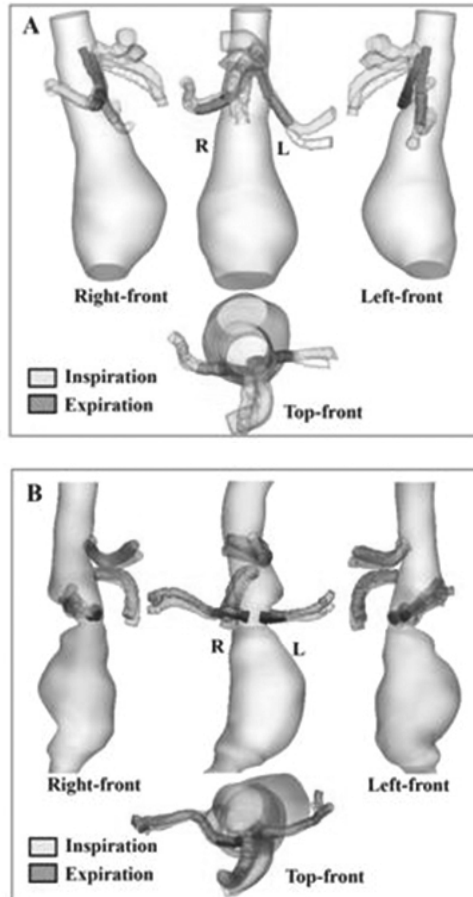


Fig 2. R = right, L = left. Respiration-induced geometry changes of celiac, superior mesenteric and renal arteries with stents (red) during inspiration (grey) and expiration (yellow). Examples shown are with (A) snorkeled-renal and (B) fenestrated-renal artery branches.

11:20 am - 11:40 am

7

Zenith p-Branch Fenestrated Endovascular Graft: How Close “Off-the-Shelf” Repair for Asian Patients with Juxtarenal Aortic Aneurysms?

Jiale OU¹, Stephen WK Cheng² - ¹Surgery, The University of Hong Kong, Hong Kong, China; ²The University of Hong Kong, China

Discussant: William J. Quinones-Baldrich, MD

Objective: The Zenith pivot branch fenestrated endovascular graft (p-branch) is a new “off-the-shelf” device to treat patients with Juxtarenal Aortic Aneurysms (JRA). Two options are currently available based on Caucasian anatomy, differing in the longitudinal distance between the SMA and the renal fenestrations. This study investigates the anatomical suitability of the p-branch fenestrated grafts in a cohort of Asian patients with JRA.

Methods: CT images of 51 consecutive patients with JRA (43 men, mean age 76.8 years) from our hospital database, were analyzed using the TeraRecon Aquarius workstation (San Mateo, California). The renal clock positions differed with the variation in graft diameters (26mm-36mm). Using the native paravisceral aortic diameter as reference, the artery positions were converted to circumferential locations and then mapped together with the diameters of corresponding arteries. Their geometric locations were then applied to the p-branch option A and B (single SMA and two renal fenestrations, and a scallop). The suitability of these stent-graft designs to the aneurysm was evaluated.

Results: 31 JRA patients (60.8%) were regarded as suitable candidates for one or both p-branch endografts (20 with option A, 22 with option B and 11 with both options). In 35 patients (68.6%) both renal arteries could be aligned with the fenestrations. Among them, 16 patients (31.4%) were perfectly matched, while 19 patients (37.2%) were only marginally suitable. The major reason for the exclusion was the misalignment of the renal pivots, mainly due to the longitudinal position of renal arteries rather than the circumferential position, particularly the longer distance of the right renal arteries from the SMA. If the right renal fenestration of option B was adjusted to 20mm caudal to SMA fenestration (level with the left fenestration), the match could reach 78.4% (40/51). Other reasons were unsuitable scallops for the celiac axis in 4 patients (7.84%) and insufficient length of the abdominal aorta to accommodate the graft in another 4 patients.

Conclusions: The present designs of the p-branch fenestrated graft are suitable for a good proportion of JRA patients in Asia. Further refinement of design may be necessary to accommodate the anatomical variations, especially a lower right renal artery.

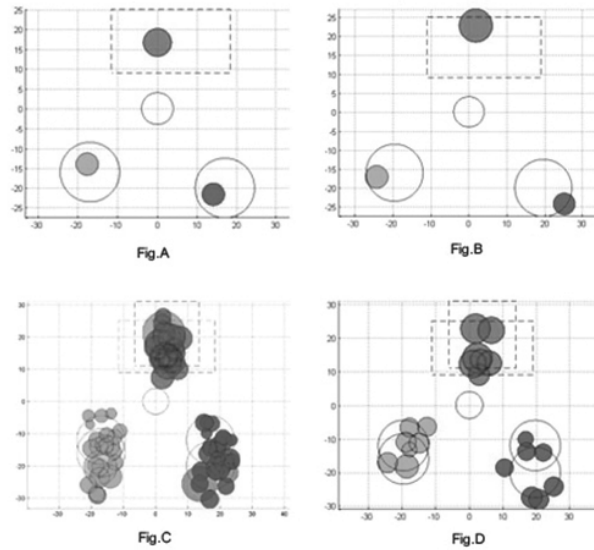


Fig. Three black circles represented the pivot fenestrations of the SMA and the two renal arteries, and the rectangle was the scallop. The filled circles stood for coeliac trunk (green) and left (red) and right (blue) renal arteries. The size of the circles represented the actual diameter of the corresponding artery. A. Perfectly suitable: all the visceral orifices located inside the fenestrations or scallop; B. Marginally suitable: part of the renal orifice (left) located outside the fenestration; C and D: candidates for the 26mm and 30mm graft respectively.

11:40 am - 12:00 pm

8

Initial Experience with Endovascular Treatment of Thoraco-Abdominal Aortic Aneurysm Using Physician Modified Endografts: B-TEVAR IDE Study

Matthew P. Sweet, MD, Benjamin W. Starnes, MD, Billi Tatum, RN, CRCC - University of Washington, Seattle, WA

Discussant: Stephen W. K. Cheng, MD

Objective: To report an initial experience with physician modified thoracic endografts for endovascular treatment of TAAA.

Methods: This study reports an initial single center experience of patients treated with physician modified thoracic endografts for TAAA. Patients were included if treated urgently for symptomatic TAAA (n=2) as well as those treated in a Phase 1 clinical trial (n=11), an FDA approved physician sponsored Investigational Device Exemption (B-TEVAR IDE). Patients were included if they had a TAAA and were deemed to be at high risk with open repair and met study inclusion criteria.

Results: A total of 13 patients (9 men and 4 women) with TAAA were treated with branched-fenestrated endovascular stent grafts. Demographic and operative details are reported in Tables 1 and 2. Nine patients (69%) had successful treatment: return to pre-operative functional state and complete aneurysm exclusion at mean 8 months (range 1-28) follow up. Two patients (15%) died. One patient died on the 22nd post-operative day due to complications of spinal cord ischemia. Another patient died 4 months after repair due to bacterial endocarditis from a foot infection. One other patient had successful aneurysm exclusion but suffered permanent SCI. One patient is clinically well despite presence of a type 3 endoleak.

Conclusions: Totally endovascular treatment of TAAA using a physician modified thoracic endograft is feasible. Although it can be done using minimally invasive means, it remains a high risk procedure. B-TEVAR is highly adaptable to complex anatomy and can be done with current commercially available devices. This treatment may provide a safe and effective means of treatment of TAAA among patients at high risk of open repair. This early experience has provided insights into the safe conduct of these procedures, including staged repair, and methods of case planning.

Demographics	
Age	72 years (63-88)
TAAA extent	N = 13
1	2 (15%)
2	3 (23%)
3	4 (31%)
4	3 (23%)
5	1 (8%)
Diameter	6.8 cm (5.5 - 9.1)
Symptomatic	2 (15%)
Prior aortic operation	5 (38%)

Operative Details	
Percutaneous Access	13 (100%)
Number of branches	3.8 (2-4)
Estimated Blood Loss	226 mL (50-500)
Length of aortic coverage	37 cm (21 - 56)
Percentage of aortic coverage (LSCA to bifurcation)	77% (46 - 100)
Contrast volume	176 mL (60-295)
Fluoroscopy Time	64 min (35 - 128)

12:00 pm - 12:10 pm

9

Physician Modified Endovascular Grafts: Graft Creation

Benjamin W. Starnes, MD, Gale Tang, MD, Billi Tatum, RN - Surgery, University of Washington, Seattle, WA

Objective: The purpose of this video mini-presentation is to describe in exquisite detail the process of Physician-Modified Endovascular Graft (PMEG) creation in high definition as part of an FDA-sanctioned Investigational Device Exemption clinical trial.

Methods: A high-definition 4-minute video was created and edited describing in detail the creation of a PMEG to successfully treat a large juxta-renal aortic aneurysm.

Results: The PMEG graft was successfully created and implanted.

Conclusions: Three-vessel custom made fenestrated devices can be created in under an hour with appropriate technique.

12:10 pm - 12:20 pm

10

The Impact of Endovascular Repair (EVAR) of Abdominal Aortic Aneurysms (AAA) on Resident Training in Elective Open Aneurysm Repair

Michael P. Harlander-Locke, MPH, Peter F. Lawrence, MD, William Quinones-Baldrich, MD, Wesley S. Moore, MD - University of California Los Angeles, Los Angeles, CA

Objective: The use of EVAR to treat AAA has resulted in a declining number and increased complexity of open AAA surgery. Our objective was to analyze trends in open repair of AAA over the last 15 years at our institution and assess its impact on resident training.

Methods: A retrospective review of 867 consecutive AAA done over the last 15 years at our institution was performed, recording type of repair, level of aortic clamping, and associated bypasses. A survey of all vascular surgery program directors was used to assess their willingness to assist vascular surgery residents in variously complex open AAA repairs.

Results: The number of open repairs of AAA has declined by 80% over 15 years (Table 1). The complexity of open AAA repair has resulted in more suprarenal and supraceliac clamping ($P < .001$), and more renal and visceral artery revascularization and bypass ($P < .001$). The willingness of attendings (67) to assist vascular surgical residents varied significantly between trainees in fellowship and integrated programs ($P < .05$). Attendings are significantly less willing to assist a PGY4/5 in an integrated vascular residency with complex open operations, compared to a 1st or 2nd year vascular fellow ($p < .05$).

Conclusions: Our experience documents that vascular surgical residents are exposed to progressively fewer open aneurysm cases. AAA cases are increasingly complex and often considered too difficult, thus decreasing resident involvement. Vascular surgery programs will need to consider supplemental open AAA training, such as simulation and/or traveling to high volume centers, for trainees to achieve competency in open AAA surgery.

Trends in AAA Repair from 1999 to 2013			
Procedure Type	1999-2003	2004-2008	2009-2013
Open	254 (70%)	89 (33%)	46 (20%)
EVAR	107 (30%)	182 (67%)	189 (80%)
Clamp Location			
Supraceliac	17 (7%)	10 (11%)	9 (20%)
Suprarenal	6 (2%)	19 (21%)	17 (37%)
Between renal arteries	7 (3%)	4 (4%)	4 (9%)
Infrarenal (<2cm neck)	132 (52%)	39 (44%)	13 (28%)
Infrarenal (>2cm neck)	92 (36%)	17 (19%)	3 (7%)
Concomitant Repairs			
Reimplantation of renal and/or visceral vessels	9 (4%)	13 (15%)	22 (48%)
Renal artery bypass	8 (3%)	7 (8%)	15 (33%)

12:20 pm - 12:30 pm

Question & Answer

12:30 pm - 2:30 pm	LUNCHEON SYMPOSIUM Radiation and RPVI
12:30 pm - 12:40 pm	Introduction/Symposium Overview
12:40 pm - 1:00 pm	Basics of Radiation Safety John S. Lane, III, MD Director, Endovascular Surgery, UCSD Chief, Vascular Surgery, La Jolla VA Hospital University of California, San Diego La Jolla, CA
1:00 pm - 1:20 pm	Reducing Exposure: Utilizing Equipment Andrew Barleben, MD, MPH Associate Professor, Department of Surgery, Division of Vascular Surgery, University of California, San Diego Staff Surgeon, Department of Surgery, Division of Vascular Surgery, VA San Diego, San Diego, CA
1:20 pm - 1:40 pm	Reducing Exposure: Maximizing Technique Jane Kim Yang, MD Assistant Professor UCLA/Olive View Medical Center Los Angeles, CA
1:40 pm - 1:55 pm	What You Need to Know for RPVI Dennis F. Bandyk, MD Chief of Vascular Surgery University of California, San Diego School of Medicine La Jolla, CA
1:55 pm - 2:10 pm	Vascular Ultrasound Principles Ankur Chandra, MD Associate Professor of Surgery and Biomedical Engineering University of Rochester School of Medicine and Dentistry Rochester, NY
2:10 pm - 2:30 pm	Panel Discussion and Q&A
2:30 pm	Adjourn
4:00-5:30 pm	TRAINEE SYMPOSIUM Job Search Satisfaction and Tips and Tricks for Trainees

MONDAY, SEPTEMBER 22, 2014

- 7:30 am - 8:00 am **Continental Breakfast With Educational Exhibitors**
- 8:00 am - 9:30 am** **SCIENTIFIC SESSION III**
Presiding: Larry W. Kraiss, MD & Benjamin W. Starnes, MD
- 8:00 am - 8:20 am 11
Brachial Artery Volume Flow by Duplex Predicts Dialysis Access Maturation
Dennis F. Bandyk, MD¹, Sae Hee Ko, MD², Kelley Hodgkiss-Harlow, MD³, John Lane, III, MD², Andrew Barleben, MD² - ¹Vascular & Endovascular Surgery, Univ. of California - San Diego, La Jolla, CA; ²Univ. of California - San Diego, La Jolla, CA; ³Kaiser Permanente - San Diego, La Jolla, CA
Proposed Discussant: TBD

Objective: To validate use of our previously described Fast Five Minute Duplex Scan which measures brachial artery volume flow (VF) to confirm the adequacy of dialysis access maturation, and predict successful hemodialysis usage.

Methods: Duplex ultrasound was used to directly measure brachial artery and dialysis access VF in 75 patients with upper extremity (UE) accesses. Using scatterplot analysis, correlation was determined between brachial artery VF and dialysis access VF. Brachial artery velocity spectra criteria were developed to estimate VF in three categories - low 800ml/min. An additional 121 patients having a primary (n=73) or revised (n=48) dialysis access had measurement of brachial VF and this was correlated with conduit maturation and hemodialysis usage. Duplex testing was performed in the outpatient clinic within 2-3 weeks of the access procedure.

Results: Duplex measurements of VF from the brachial artery demonstrated a high degree of correlation ($R^2=0.87$) with access conduit VF for both autogenous vein (n=45; $R^2=0.88$) and bridge grafts (n=30; $R^2=0.85$). Access VF >800 ml/min is predicted when duplex testing indicates a brachial artery diameter >4 mm, PSV >150 cm/s, and diastolic/systolic velocity ratio >0.3. Brachial artery VF <800 ml/min was associated with failure of access maturation. Revision was required in 13 of 16 accesses with VF<600 ml/min and 3 of 11 with VF in the 600-800 ml/min range. Only 1 of 94 with VF>800 ml/min required revision (for conduit depth), and all were successfully used for hemodialysis.

Conclusions: The Fast Five Minute Duplex Scan is an accurate technique to predict UE dialysis access maturation and successful hemodialysis usage. Brachial artery VF is easy to measure, applicable to both forearm and arm accesses, and is highly correlated to AV access VF. VF >800 ml/min predicts a functional access suitable for cannulation if conduit anatomy criteria are also verified.

8:20 am - 8:30 am

12

Migration towards Proximal Location Improves Maturation Rate of Arteriovenous Fistula

Edward D. Gifford, MD, Virginia Nguyen, BS,
Amy H. Kaji, MD, PhD, Patrick Chisum, BS,
Jerry Kim, MD, Annie Zeng, Ramanath
Dukkipati, MD, Christian deVirgilio, MD -
Surgery, Harbor-UCLA Medical Center, Torrance,
CA

Introduction: In recent years vascular surgeons have noted that a major drawback to the Fistula First initiative has been the failure of arteriovenous fistula (AVF) to reach maturation. In May of 2012 we adopted a protocol and hypothesized that such a protocol would lead to a decrease in fistula failures.

Methods: A retrospective study of all dialysis access procedures performed by a single vascular surgeon before (Period 1, 10/2009 - 4/2012) and after (Period 2, 5/2012-12/2013) the protocol initiation. The protocol included favoring the brachiocephalic (BC) location unless the patient was an ideal anatomic candidate for a radiocephalic (RC) AVF, creating a larger and standardized arteriotomy, and utilization of a large venous footplate whenever possible. The main outcome measure was failure to achieve maturation. Secondary outcomes were type of fistula, steal syndrome, time to maturation, and central catheter infections.

Results: 232 vascular access procedures were performed, of which 90.1% were AVF. There was no difference in utilization of AVF over AV graft between Period 1 (93% AVF) and Period 2 (86% AVF, $P=0.1$). Of 209 AVF, 11 patients (5.3%) were lost to follow-up, and 7 patients (3.3%) were awaiting a second stage procedure, leaving 191 patients with maturation data (Table 1). BC AVF was performed more often in Period 2 ($P=0.01$), with a trend towards decreased use of RC AVF ($P=0.06$). Median arteriotomy size in Period 2 was 7 mm. Failure of maturation was significantly decreased in Period 2 (OR 5.0, 95% CI 1.2-infinite, $P=0.03$), as was the incidence of central catheter infections ($P=0.006$). There was no difference in steal syndrome ($P=1.0$) or time to maturation ($P=0.3$).

Conclusion: Creating a standardized AVF protocol resulted in a significant decrease in the rate of AVF failure. This was achieved while maintaining the same high percentage of fistulas, a lower rate of central catheter infections, and the same low incidence of steal syndrome. We were able to decrease rates of AVF failure by following strict anatomic guidelines, including preferential migration to BC location, generous arteriotomy and use of a large venous footplate.

Table 1. Comparison of AVF data between study periods, median values

	Period 1 (n=94)	Period 2 (n=97)	OR, 95% CI	P value
Male gender	64 (68%)	64 (66%)	1.1, 0.6-2.0	0.8
Brachiocephalic	35 (37%)	54 (56%)	0.6, 0.3-0.8	0.01
Radiocephalic	34 (36%)	22 (23%)		0.06
Superficialization	25 (27%)	20 (21%)	1.4, 0.7-2.7	0.3
Diabetes	65 (69%)	60 (62%)	1.4, 0.8-2.5	0.3
Tobacco use	10 (11%)	4 (4%)	2.8, 0.8-9.2	0.1
Maturation Time (median days, IQR)	69, 45-110	56, 44-106		0.3
Failure of Maturation	9 (10%)	2 (2%)	5, 1.1-23.9	0.03
Steal	3 (3%)	4 (4%)	0.8, 0.2-3.5	1
Central catheter infection	7 (7%)	0	NA	0.006

8:30 am - 8:40 am

13

Intraoperative Evaluation is Superior to Preoperative Venous Mapping in Predicting Arteriovenous Fistula Success

Khanh P. Nguyen, MD, Theodore Teruya, MD, Neha Sheng, MD, Olamide Alabi, MD, Jason Chiriano, DO, Christian Bianchi, MD, Salem Dehom, MPH, Ahmed Abou-Zamzam, MD - Loma Linda University Medical Center, Loma Linda, CA

Objective: Although preoperative ultrasound vein mapping (preop US) is often used to determine patient eligibility for fistula creation, technical inaccuracies may erroneously exclude patients. A policy of routine intraoperative assessment of all patients despite poor preop US may lead to greater fistula creation rates but higher failure rates. This study evaluated whether preop US or intraoperative assessment is better correlated with fistula success.

Methods: Between February 2007 and July 2012, all autologous arteriovenous fistulas (AVFs) created at a single Veterans Administration medical center were examined. Access maturation, patency and failure rates were determined. Preop US was used to classify patients as good (vein > 3mm) or poor candidates (<3mm). Intraoperative assessment of the veins was routinely performed and patients classified as good or poor candidates qualitatively. Outcomes were compared based on preop US vein mapping and intraoperative evaluation.

Results: Over the 5 yr time period, 387 fistulas were created in 361 patients (mean age 64±10 yrs, BMI of 28±7). In patients with preoperative vein sizes of <3 mm (36% of patients) or ≥ 3 mm (64%), the maturation and overall failure rates were 71 vs 75% (p=0.61) and 68 vs 58% (p=0.15), respectively. In patients with assessments of poor (14% of patients) or good veins (86%) at time of operation, the maturation and overall failure rates were 42 vs 82% (p<0.001) and 86 vs 54% (p<0.001). Those with poor veins underwent intraoperative dilation more frequently (31 vs 6%, p<0.001). In patients with small preop vein size (<3 mm), intraoperative assessment of good quality vessels was associated with a 73% maturation rate.

Conclusions: Intraoperative assessment but not preoperative vein mapping appears to be more accurately associated with maturation and overall failure rates. Therefore, even in patients with inadequate preoperative vein mapping, surgical intraoperative assessment may still be warranted.

8:40 am - 8:50 am

14

Utilization of Venous Duplex Scanning and Postoperative Venograms in Patients with Subclavian Vein Thrombosis

Megan S. Orlando, Kendall C. Likes, Ying Wei Lum, MD, Julie A. Freischlag, MD - Johns Hopkins Medical Institutions, Baltimore, MD

Objective: To review pre- and postoperative duplex scans and postoperative venograms in patients with subclavian vein thrombosis who underwent first rib resection and scalenectomy (FRRS) during 2005-13.

Methods: Preoperative venous duplex scans revealed no compression (NC), venous compression (VC, $\geq 50\%$ decrease in velocity on abduction), venous ablation (VA, 0 velocity on abduction), and acute thrombus (AT, 0 velocity on abduction and adduction). Correlation with two-week postoperative venograms (open, stenosis requiring dilatation, or occluded) and postoperative (2-4, 6-8, and 12-month) duplex scans was performed.

Results: 140 of 215 patients treated with FRRS had an ipsilateral preoperative duplex scan and postoperative venogram. 29 (21%) patients had VC, 70 (50%) VA, 8 (5.7%) AT, and 33 (24%) NC. Patients with preoperative NC or VC were more likely to have an open vein on venogram ($P < .02$) (see table). 6-8 months after FRRS, patients with preoperative VA were more likely to have compression or ablation ($P < .01$); no difference was seen at one year. Patency rates at last follow up were 100% in the preoperative VC and AT groups, and 97% in those with VA or NC. 128 preoperative scans of the asymptomatic side revealed 67 (52%) patients had NC, 29 (23%) VC, 32 (25%) VA, and zero AT. Patients with NC, VC or VA were significantly more likely to have the same result on the opposite side ($P < .05$).

Conclusions: Postoperative duplex scans reveal VC and VA resolve over the year following FRRS, obviating the need for repeat venograms or intervention. Patency rates are excellent in all patients when postoperative venography directs intervention. Patients with NC, VC or VA on preoperative scans often show the same result on the opposite side.

Two-Week Postoperative Venogram Results				
	Symptomatic-side NC (N=33)	Symptomatic-side VC (N=29)	Symptomatic-side VA (N=70)	Symptomatic-side AT (N=8)
Open	15 (45%)	15 (52%)	22 (31%)	2 (25%)
Stenosis (dilated)	11 (33%)	9 (31%)	37 (53%)	4 (50%)
Occluded	7 (21%)	5 (17%)	11 (16%)	2 (25%)

8:50 am - 9:10 am

§15

Carotid Stent Performance: Experience Matters More Than Specialty

Michael D. Sgroi, MD¹, Nii-Kabu Kabutey, MD¹, Andrew R. Barleben, MD², John S. Lane, III, MD², Roy M. Fujitani, MD¹ - ¹University of California, Irvine, Orange, CA; ²University of California, San Diego, San Diego, CA

Discussant: Ronald L. Dalman, MD

Objective: The introduction of carotid stenting has led to a rapid rise in the number of specialists performing this procedure. The CREST trial has shown that carotid stenting can be performed with an equivalent major event rate, as compared to carotid endarterectomy. However, there is still controversy regarding the training and experience required to safely perform this procedure. This observational study examines the performance of carotid stenting with regard to specialty and case volume.

Methods: From 2004-2011 patients diagnosed with carotid stenosis who had a carotid stenting procedure were extracted from the Nationwide Inpatient Sample database. The cohort was separated based on the provider performing the procedure (surgeon vs. interventionalist), hospital location, and volume. Surgeons were defined as providers who also performed either a carotid endarterectomy or femoral-popliteal bypass during the same time interval. Primary endpoints analyzed included stroke, MI, 30-day mortality. Length-of-stay and hospital costs were also analyzed as secondary outcomes.

Results: 20,663 cases of carotid stenting were found. A total of 15,305 (74%) cases were identified to be performed by a “surgeon”, while 5,358 (26%) were done by an “interventionalist”. The majority of cases were done at hospitals in urban locations (96.51%) and designated teaching institutions (61.47%). Unadjusted outcomes were similar between surgeons and interventionalist in terms of stroke (4.33% and 4.41%), MI (2.10% and 2.13%), and mortality (0.84% and 1.03%), respectively. Qualitatively, volume per 10 cases was shown to decrease the risk of stroke. Adjusted multivariate analysis demonstrated no statistical significance between primary endpoint outcomes. However, length of stay (2.81 vs 3.08 days) and total charges (\$48,087.61 and \$51,718.77) were lower for procedures performed by surgeons (Table 1).

Conclusions: Surgeons are performing the majority of carotid stent procedures in the US. The volume of cases performed by a provider, rather than the provider’s specialty, appears to be a stronger predictor of adverse outcomes for carotid stenting. There was, however, significant cost differences between surgeons and interventionalists, which needs to be further evaluated at an institutional level.

Table 1: Carotid Stent Outcomes Based on Provider and Hospital Volume

Carotid Stent Outcomes Based on Provider and Hospital Volume		
Variable	Adjusted Risk/Mean (95% CI)	P-value
In-hospital mortality		
Interventionist vs. Surgeon	1.29 (0.90, 1.84)	0.1728
10-unit Volume difference	1.01 (0.96, 1.05)	0.7767
Stroke (CVA)		
Interventionist vs. Surgeon	1.00 (0.84, 1.19)	0.9819
10-unit Volume difference	0.97 (0.94, 0.99)	<0.005
MI		
Interventionist vs. Surgeon	1.14 (0.90, 1.43)	0.2803
10-unit Volume difference	0.99 (0.96, 1.02)	0.6010
Length of stay (days)		
Interventionist vs. Surgeon	0.29 (0.14, 0.44)	<0.005
10-unit Volume	-0.05 (-0.06,-0.04)	0.0000
Total charge (\$)		
Interventionist vs. Surgeon	2,943.90 (1,321.96, 4,565.84)	<0.005
10-unit Volume	98.39 (-55.77, 252.55)	0.2110

9:10 am - 9:30 am

§16

Predictors and Consequences of Hemodynamic Instability Following Carotid Artery Stenting

Tiffany Y. Wu, MD¹, Sung W. Ham, MD², Steven G. Katz² - ¹Huntington Hospital, Pasadena, CA; ²USC Surgeons, Pasadena, CA

Discussant: Michael T. Caps, MD

Objective: To determine the predictors and consequences of hemodynamic instability following carotid artery stenting (CAS).

Methods: The records of all patients undergoing CAS in a single institution were reviewed. Patient demographics and risk factors were recorded. Indications for CAS, medications including statins, atropine, and beta blockers, anatomic risk factors, balloon and stent length and diameter, as well as degree of stenosis were noted. The presence of peri-procedural hypertension (SBP>180), hypotension (SBP<90), and bradycardia (HR<60) lasting longer than one hour was documented, as was more transient HI. Rates of TIA, stroke, myocardial infarction, and death within 30 days of the procedure were calculated. Chi-square analysis was used to determine the role of peri-procedural factors in predicting the risk of hemodynamic instability (HI) and to determine if patients experiencing HI were more likely to suffer major adverse events (MAE) than those who did not.

Results: Between 2005 and 2012, 199 CAS were performed in 191 patients. One hundred seventeen were male and 74 were female. Their ages ranged from 46 to 92 years (mean 73.6 years). Eighty seven percent had hypertension, 48.5% were smokers, 48% had coronary disease, and 38% were diabetic. CAS was performed for asymptomatic stenosis in 56% of patients, 24% had previous TIA, and 20% previous stroke. Sixty three percent of patients were on statins, 41.4% on beta blockers, and 92% received atropine before balloon dilatation or stent placement. Overall, 130 (65.3%) patients experienced HI and 67 patients (33.7%) experienced HI lasting longer than one hour. Octogenarians were more likely to suffer both transient and prolonged HI, angina or contralateral occlusion were associated with an increase in overall HI, and female sex was predictive of prolonged HI alone. Transient HI was not predictive of MAE. Patients with HI persisting longer than one hour were more likely to suffer a TIA than those who did not (p=0.045), but they were no more likely to experience stroke, MI, or death (p>0.35 for each).

Conclusions: Peri-procedural HI occurs frequently during CAS even with prophylactic atropine administration. While patients experiencing HI were more likely to suffer a TIA, its presence is not associated with an increase in stroke, myocardial infarction, or death.

9:30 am - 10:00 am	Coffee Break With Educational Exhibitors
10:00 am - 11:45 am	SCIENTIFIC SESSION IV Presiding: Larry W. Kraiss, MD & Benjamin W. Starnes, MD
10:00 am - 10:20 am	17 Cranial Nerve Injury (CNI) in the Carotid Revascularization Endarterectomy versus Stenting Trial (CREST): Incidence, Outcomes and Quality of Life Robert J. Hye, MD ¹ , Ariane Mackey, MD ² , Jenifer Voeks, PhD ³ , David J. Cohen, MD ⁴ , Kaijun Wang, PhD ⁴ , MeeLee Tom, MS ⁵ , Thomas G. Brott, MD ^{6,5} - ¹ Kaiser Permanente, San Diego, CA; ² HÃpital de l'Enfant-JÃsus, Quebec, QC, Canada; ³ Medical University of South Carolina, Charleston, SC; ⁴ St. Luke's Hospital, Kansas City, MO; ⁵ Rutgers University, Newark, NJ; ⁶ Mayo Clinic, Jacksonville, FL <i>Discussant: John S. Lane, III, MD</i>

Objectives: CNI is the most common neurologic complication of carotid endarterectomy (CEA) and can cause significant chronic disability. Nonetheless, data from prior randomized trials are limited. Incidence of CNI, baseline and procedural characteristics, outcomes and quality of life (QOL) scores were evaluated in the 1151 patients randomized to CEA.

Methods: Patients with CNI were identified and classified using Case Report Forms, adverse event data and clinical notes. Baseline and procedural characteristics were compared using descriptive statistics. Clinical outcomes at 1 and 12 months were analyzed. All data was adjudicated by two Neurologists and a Vascular Surgeon. QOL was evaluated using the SF-36 to assess general health and Likert Scales for disease specific outcomes at 2 weeks, 4 weeks and 12 months after CEA. The effect of CNI on SF-36 subscales was evaluated using random effects growth curve models and Likert Scale data was compared by logistic regression.

Results: CNI was identified in 53 (4.6%) patients. Nerves injured were VII in 30.2%, XII in 24.5%, IX/X in 41.5% and 3.8% had Horner's syndrome. No baseline or procedural factors were predictive of CNI. Deficits resolved in 18 (34%) patients at 1 month and in 41 (80.4%) of 51 patients with 1 year follow-up. One year outcome could not be determined in 2 patients. Classifying those patients as unresolved results in persistent CNI in 22.6% of patients at 1 year. QOL evaluation by SF-36 showed no statistical difference between groups with and without CNI at 2 weeks, 4 weeks and 1 year. By Likert scale analysis, the

group with CNI showed a significant difference in the difficulty eating/swallowing parameter at 2 and 4 weeks but not at 1 year ($p=0.0001$).

Conclusions: In CREST, CNI occurred in 4.6% of patients undergoing CEA with 34% resolution at 30 days and 77.4% at 1 year. CNI had a small effect on QOL, negatively impacting only difficulty eating/swallowing at 2 and 4 weeks but not at 1 year.

10:20 am - 10:40 am

§18

The Pulseless Limb In War Trauma: Does It Predict An Arterial Injury?

Jacob F. Quail, MD¹, Victoria S. McDonald, MD²,
Kristina K. Carter, PhD², Jeffrey S. Weiss, MD^{2,3},
Kevin Casey, MD^{2,3} - ¹General Surgery, Naval
Medical Center San Diego, San Diego, CA; ²Naval
Medical Center San Diego, San Diego, CA;
³NATO Role III, Multinational Medical Unit,
Kandahar, Afghanistan, Afghanistan

Discussant: Niten Singh, MD

Objectives: A pulseless limb is considered a hard sign of vascular injury following penetrating trauma in the civilian population. However, the reliability of this finding has never been examined in combat trauma. The purpose of this study was to examine the reliability of the pulseless limb in the combat trauma population.

Methods: The Joint Theater Trauma Registry (JTTR) identified all patients who presented to a military treatment facility in Kandahar, Afghanistan with a penetrating extremity injury over a two-year period. Patients with pulseless limbs were followed and the results of the subsequent computed tomographic angiogram (CTA) or angiogram recorded. Patient demographics and injury patterns were examined. Standard statistical analysis was performed.

Results: From 2011-2012, 638 patients were treated for penetrating extremity injuries. The mechanisms of injury were explosions (62%), firearms (20%), or other etiology (18%). Of the 566 patients with complete records, 436 (77%) presented with palpable pulses, 119 (21%) presented with a pulseless limb, and 11 (2%) presented with other hard signs of vascular injury. Forty-two patients (35%) with a pulseless limb underwent an immediate CTA (83%) or angiogram (17%) that identified no vascular injury. Twenty-six of those patients (62%) sustained an injury from an explosion, 14 (33%) from a gunshot wound, and 2 (5%) from other causes. Patients with an abnormal pulse exam and normal CTA/angiogram were compared to all other patients following a penetrating injury. There was a significantly higher chance of a pulseless limb as a result of a gunshot injury, but not an explosion or other mechanism of injury ($p < 0.0005$). Patient variables and risk factors were analyzed. Acidosis ($p < 0.0005$), gunshot wounds ($p = 0.025$), and battle injuries ($p = 0.031$) were associated with an abnormal pulse exam and normal CTA or angiogram.

Conclusions: Unlike previous studies, our results demonstrate that a pulseless limb poorly predicts a vascular injury in this population. Acidosis, a surrogate for under-resuscitation following penetrating injuries, may contribute to the decreased accuracy of the physical examination in combat warriors. Future studies must continue to focus on improved algorithms for accurate diagnosis of extremity vascular injuries in this population.

10:40 am - 10:50 am

19

Popliteal Artery Trauma: Is There a Standardized Approach To Managing These Patients? Results of a Survey

Elina Quiroga, MD, Niten Singh, MD, Benjamin W. Starnes, MD, Nam T. Tran, MD - University of Washington, Seattle, WA

Objective: Popliteal artery trauma is a devastating injury that affects mostly young, active patients and has a reported high limb loss rate. Not only is there scarce information on long term outcomes, little is known on how these patients are managed periprocedurally. The purpose of this study is to describe the current management practices in our vascular community regarding popliteal artery trauma.

Methods: A voluntary, anonymous survey regarding preoperative evaluation, intraoperative management and postoperative medications and follow up recommendations was sent electronically to 202 members of Western Vascular Society during the month of March 2014.

Results: 97 surgeons responded to the survey (response rate 48%). Of those that responded 65% were in an academic practice and 35% in a hospital-based/private practice. Of those surgeons responding: 29 % manage 1-5 trauma cases/year; 26% manage 6-10 trauma cases/year; 24% manage 10-20 trauma cases/year; and 19% manage more than 20 trauma cases/year. The imaging modality utilized in patients when the ankle brachial index (ABI) was <0.9 was the following: CTA 46%, arteriography 21%, and arterial duplex 30%. Regarding procedural details and proximal control of the vessel, 60% of surgeons performed a direct cutdown on the proximal popliteal artery, 30% utilized a tourniquet, and 10% responded other (balloons, CFA cutdown). Also, no consensus response was obtained regarding antiplatelet or anticoagulant therapy after arterial or venous repair (table). The response to postoperative duplex ultrasound (DU) surveillance was varied as well and was the following: 71% recommend DU during the first month, 51% DU at 6 months, 48% DU at one year and 39% recommending DU every year.

Table: Type and duration of antiagregant or anticoagulant treatment after repair.

	6 weeks	3 months	6 months	Lifelong	No
Interposition Bypass					
Aspirin 81	9%	8%	16%	28%	39%
Aspirin 325	0	4%	17%	28%	51%
Clopidogrel	9%	8%	0	0	83%
Arterial Primary repair					
Aspirin 81	9%	8%	22%	20%	41%
Aspirin 325	0	5%	15%	27%	53%
Clopidogrel	8%	8%	0	0	84%
Vein repair					
Heparin/Warfarin	8%	23%	34%	0	35%
Aspirin	6%	12%	13%	47%	22%
Clopidogrel	8%	6%	1.5%	1.5%	83%
Direct Thrombin inhibitor	3%	7%	0	0	90%

Conclusions: The results of this survey reveal that even in our regional society management of popliteal artery trauma varies widely. As this injury usually results in a consultation to the vascular surgeon, a long-term outcome study with cost benefits analysis of these practices needs to be done in order to provide the best care to our patients.

10:50 am - 11:10 am

§20

What is the Normal Toe Brachial Index? Results from Healthy Young Adults

Adrian Fung, Whitney L. Quong, Rollin Y. Yu,
York Hsiang, MD - Division of Vascular Surgery,
University of British Columbia, Vancouver, BC,
Canada

Proposed Discussant: TBD

Objective: The purpose of this study was to measure the toe-brachial index (TBI) in healthy young adults and compare it with the accepted reference range.

Methods: Medical Students from the undergraduate class were prospectively recruited. Participants completed questionnaires on physical measurements (height, weight), lifestyle factors (physical activity and type, smoking status, alcohol consumption), and medical history (medications, relevant diagnoses, family history). Bilateral brachial, ankle (using both dorsalis pedis and posterior tibial arteries) and toe blood pressures were measured. TBI was calculated as the mean great toe blood pressure divided by the average of the higher arm systolic blood pressure.

Results: 40 medical students with a mean age of 24.7 ± 2.1 without any comorbidities were studied. Participants maintained relatively healthy lifestyles (hours of activity per week: 5.0 ± 2.6 ; BMI: 21.7 ± 5.8). Caffeine and alcohol consumption was modest (mean of 7.4 cups and 1.9 servings, respectively). There are no current smokers. The mean brachial blood pressure was 121 ± 18 mmHg (right), and 116 ± 18 mmHg (left). The TBI was 0.95 ± 0.22 (right) and 0.97 ± 0.24 (left) for males, and 0.87 ± 0.25 (right) and 0.86 ± 0.39 (left) for females.

Conclusion: The results of TBI (Left: 0.92 ± 0.24 , right: 0.93 ± 0.34) in this healthy population differ significantly from the referenced normal range. Our findings (95% confidence interval) suggests that the accepted value of normal being greater than 0.7 is too low, especially for males, and may promote underdiagnosis of peripheral vascular disease. In addition, there is a significant difference between male and female TBI ($p < 0.05$). Thus, we recommend that the TBI reference range be modified to increase the clinical utility of this measurement and promote timely intervention.

11:10 am - 11:45 am	PRESIDENTIAL ADDRESS The Future of Vascular Surgery Peter A. Schneider, MD
11:45 am - 12:30 pm	WVS Business Meeting
12:30 pm - 2:20 pm	LUNCHEON SYMPOSIUM Hemodialysis and Closure New Technology
12:30 pm - 12:35 pm	Introduction/Symposium Overview
12:35 pm - 12:45 pm	Navigating The Guidelines For Successful AVF Creation - Is It Is Possible To Succeed? Mark R. Nehler, MD Professor of Surgery, the Michael W. Dunaway Chair in Vascular Surgery Chief, Section of Vascular Surgery and Endovascular Therapy and Podiatry University of Colorado, School of Medicine Aurora, CO
12:45 pm - 12:55 pm	Unusual Dialysis Access: Do These Really Work? Ahmed Abou-Zamzam, MD Vascular Surgery Loma Linda University Medical Center Loma Linda, CA
12:55 pm - 1:05 pm	Point Of Care Ultrasound (POC): Can This Assist In Maintaining Patent AVF? Gale L. Tang, MD Assistant Professor of Surgery, UW Harborview Medical Center VA Puget Sound Health Care System Seattle, WA
1:05 pm - 1:15 pm	How Small Can The Vein Be For Successful AVF And How Did We Obtain These Numbers? Niten Singh, MD Associate Professor of Surgery University of Washington Seattle, WA

1:15 pm - 1:25 pm	Percutaneous Access- Historical Perspectives David Deaton, MD Chesapeake Vascular, PC Crownsville, MD
1:25 pm - 1:35 pm	Large Bore Percutaneous Closure - How to Do It Successfully Benjamin W. Starnes, MD Professor and Chief Division of Vascular Surgery University of Washington Seattle, WA
1:35 pm - 1:45 pm	Suture Mediated Closure Devices- What Are Tips and Techniques to Avoid Complications Brian G. DeRubertis, MD Assistant Professor of Surgery Division of Vascular Surgery David Geffen School of Medicine at UCLA Los Angeles, CA
1:45 pm - 2:00 pm	Non-Suture Mediated Closure Devices- What Is Available? Reagan W. Quan, MD Director, Vascular and Endovascular Surgery Wellspan Heart and Vascular York, PA
2:00 pm - 2:30 pm	Panel Discussion and Q&A
2:30 pm	Adjourn

TUESDAY, SEPTEMBER 23, 2014

7:00 am - 7:30 am	Continental Breakfast With Educational Exhibitors
7:30 am - 9:00 am	SCIENTIFIC SESSION V Presiding: Larry W. Kraiss, MD & Benjamin W. Starnes, MD
7:30 am - 7:50 am	21 Outcomes Following Stent-Graft Therapy of Dissection Related Aneurysmal Degeneration in the Descending Thoracic Aorta Derek P. Nathan, MD, Sherene Shalhub, MD, Gale L. Tang, MD, Matthew P. Sweet, MD, Edward D. Verrier, MD, Nam T. Tran, MD, Gabriel S. Aldea, MD, Benjamin W. Starnes, MD - University of Washington, Seattle, WA <i>Discussant: Carlos A. Donayre, MD</i>

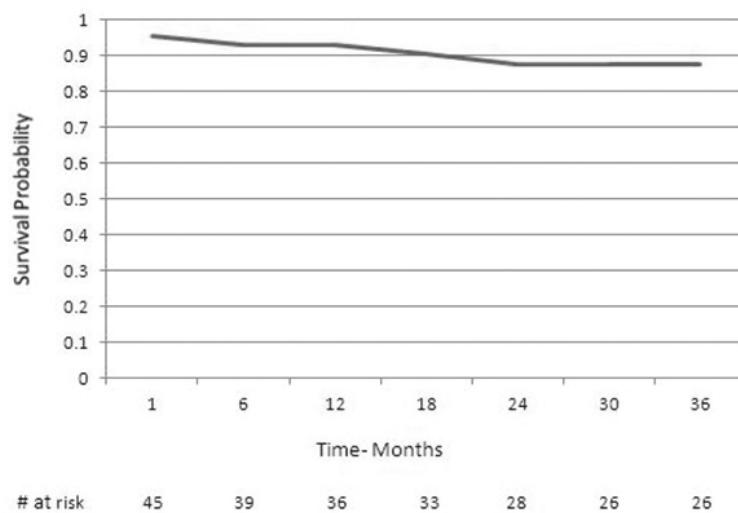
Objectives: Although stent-graft therapy has emerged as a treatment option for dissection related aneurysmal degeneration in the descending thoracic aorta (DRAD DTA), questions remain concerning the incidence of retrograde dissection, spinal cord ischemia, and secondary aortic interventions.

Methods: Data on patients who underwent stent-graft therapy for DRAD DTA at a single institution between January 2006 and September 2013 were retrospectively analyzed. Perioperative and mid-term outcomes were assessed.

Results: Forty-five patients underwent stent-graft therapy for DRAD DTA during the study period. Mean age of the patients was 58 ± 12 years; 73% (n=33) were male. Four (9%) patients underwent non-elective repair for rupture or refractory pain. Previous type A dissection repair was performed in 27% (n=12) of patients; 67% (n=8) of these patients underwent aortic arch replacement or debranching prior to or at the time of stent-graft therapy. The left subclavian artery was covered in 49% (n=22) of patients; revascularization was performed in 86% (n=19) of these patients. Abdominal aortic debranching was performed in 4 patients. Spinal drains were used in 73% (n=33) of patients. Spinal cord ischemia developed in 3 patients: 2 cases resolved and 1 improved. There were no cases of retrograde aortic dissection. Thirty-day mortality was 4% (n=2); one death was in a ruptured patient. Mean clinical follow-up was 29 ± 21 months (2 patients had no follow-up). Mean radiographic follow-up was 25 ± 16 months (4 patients had no radiographic follow-up). Of the 39 patients with radiographic follow-up, 85% (n=33) had reduced or stable aneurysm diameters; 12% (n=4) of these patients underwent secondary aortic interventions. An

additional patient died during an attempted secondary aortic intervention. One- and 3-year Kaplan-Meier survival was 91% and 84%, respectively.

Conclusions: Stent-graft therapy can be performed safely and effectively in the management of DRAD DTA. In this single-center study, there were no cases of retrograde dissection and 1 case of permanent spinal cord ischemia. Eighty-five percent of patients with radiographic follow-up had reduced or stable aneurysm diameters. Aortic arch and abdominal aortic interventions may play an important role in management of DRAD DTA.



7:50 am - 8:00 am

22

**Staged Hybrid Repair of Combined Ascending/
Descending Thoracic Aortic Aneurysms Using
the Frozen Elephant Trunk Technique with the
Cook Zenith Tx2 Stent-Graft**

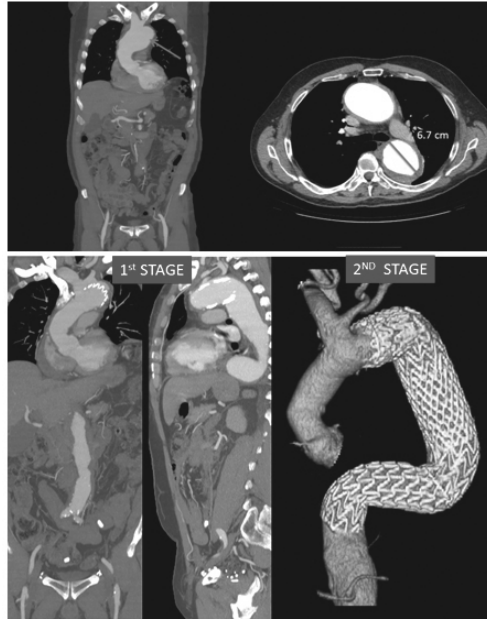
Osvaldo Yano, MD, Vicken Melikian, MD, Daniel Pellegrini, MD, Hong T. Hua, MD - Vascular Surgery, Kaiser Permanente San Francisco, San Francisco, CA

Objectives: To present our results with a novel approach to combined ascending/descending aortic aneurysms treated with staged frozen elephant trunk technique.

Methods: Between January 2011 to December 2013, 149 patients underwent ascending, 38 descending thoracic aortic aneurysm repairs at our institution. Within this cohort, 5 patients underwent staged frozen elephant trunk technique as a treatment modality. The first stage involved sternotomy, cardiopulmonary bypass and circulatory arrest to allow replacement of the ascending aorta using a hemi-arch repair. Prior to closure of the distal arch anastomosis, the Cook Zenith TX2 stent-graft was unsheathed and directly anastomosed to the aorta distal to left common carotid or left subclavian origin. Patients were allowed to recover, and brought back for second stage endovascular stent-graft repair to exclude the descending aortic aneurysm.

Results: There were no perioperative deaths or spinal cord ischemia, and no attachment site endoleaks. One embolic stroke occurred during the hemi-arch repair. This patient recovered fully, and subsequently had a successful stent-graft repair of her descending thoracic aortic aneurysm. No secondary intervention has been needed to date with median follow-up of 13 months.

Conclusions: Although limited, our experience demonstrates that the utilization of a commercially available stent-graft can provide a consistent and reliable device for use in the frozen elephant trunk. By concentrating our efforts initially to the open repair of the ascending/arch segment, the need for extended circulatory arrest and thus systemic ischemia is minimized. Subsequent staged endovascular repair of the descending thoracic aortic segment is facilitated by the presence of a reliable device serving as the frozen elephant trunk to provide sufficient proximal anchor. Furthermore, the second stage with normal aortic flow allows for angiography-based deployment of the stent-graft in the aorta at its ideal distal anchoring site.



8:00 am - 8:20 am

23

Adherence to EVAR Device Instructions-For-Use (IFU) Guidelines Has No Impact on Long Term Outcomes

Joy P. Walker, MD¹, Lue-Yen Tucker², Philip Goodney³, Hong Hua⁴, Steven Okuhn⁴, Ann Rhoades⁵, Bradley Hill⁶, Robert W. Chang⁷ -

¹Vascular and Endovascular Surgery, University of California San Francisco, San Francisco, CA;

²Kaiser Permanente Division of Research, Oakland, CA; ³Dartmouth-Hitchcock Medical Center,

Lebanon, NH; ⁴The Permanente Medical Group, San Francisco, CA; ⁵Kaiser Permanente, Oakland, CA; ⁶The Permanente Medical Group, Santa Clara, CA; ⁷The Permanente Medical Group, South San Francisco, CA

Discussant: Jason T. Lee, MD

Objective: Prior reports have suggested unfavorable outcomes after EVAR performed outside of the recommended IFU. We report our long-term EVAR experience with regard to IFU in a large multicenter registry.

Methods: Between 2000 and 2010, 1736 patients underwent EVAR, with 92% follow-up. Baseline anatomic measurements obtained from M2S, Inc. imaging database were compared with device-specific IFU. Primary outcomes were mortality and aneurysm-related mortality (ARM). Secondary outcomes were endoleak status, adverse events and reintervention.

Results: During the median follow-up of 2.7 years, 489 (28.2%) patients had preoperative anatomic data available. Overall, 58% had EVAR performed within and 42% outside of IFU guidelines. 62.4% of outside-IFU cases had short neck length, 10.2% had greater angulation, 7.3% did not meet neck diameter criteria, and 20% had multiple anatomic issues. There was no difference in any of the primary or secondary outcomes between the two groups (Table). Percent change in aneurysm sac size over time appeared similar (-12.1% vs. -14.1% at 5 years), with no significant difference in sac increase at any time point during follow up. Cox proportional hazard models showed that IFU non-adherence was not predictive of overall mortality (HR 1.06, p=.80), ARM (HR .17, p=.07) or adverse events (HR .84, p=.61).

Conclusions: In our cohort of EVAR patients with detailed preoperative anatomic information and long-term follow-up, overall mortality and ARM are unaffected by IFU adherence, despite a higher proportion of females and larger aneurysms in the non-adherent group. In addition, rates of late endoleak and reintervention are similar, suggesting that operator experience and patient selection influence outcomes despite lack of IFU-based anatomic suitability.

Table. Select demographics and outcomes by IFU status			
	IFU Adherent (n=284)	IFU non-adherent (n=205)	p-value
Female	6.7%	14.6%	<.01
Baseline AAA size	56.6mm	59.7mm	<.01
Overall Mortality	21.1%	21.5%	.93
ARM	2.8%	1.0%	.20
Type I/III leak	3.5%	4.4%	.62
Adverse events	8.8%	11.2%	.38
Reintervention	13.4%	17.6%	.20

8:20 am - 8:30 am

24

Extended Proximal Seal Zone during EVAR Predicts Aneurysm Sac Regression

Zachary M. Arthurs, MD¹, Kenneth Ouriel, MD², M. Burrell Welborn III, MD³, Huey B. McDaniel, MD⁴ - ¹Vascular Surgery, San Antonio Military Medical Center, San Antonio, TX; ²Syntactx, New York, NY; ³Valley Vascular Consultants, Huntsville, AL; ⁴St. Dominic's Cardiovascular Surgical Associates, Jackson, MS

Sponsored by: Benjamin W. Starnes, MD

Objective: The success of endovascular aneurysm repair (EVAR) is often stratified in terms of proximal neck morphology. Irrespective of traditional aortic neck definitions, detailed imaging analysis of endograft-aortic wall apposition may elucidate the effect of the seal zone extension on aneurysm-related outcomes.

Methods: Core laboratory analysis of computed tomographic (CT) scans was performed in 41 patients undergoing EVAR with the AFX™ endograft (Endologix, Irvine, CA). AFX incorporates highly conformable ePTFE material external to the stent frame, moving independently to facilitate endograft-aortic wall apposition (ActiveSeal™). Aortic neck length was defined as the infrarenal aortic length where the aortic diameter remained within 10% of infrarenal reference. The effective seal length and apposition surface area were determined based on the area with 360° apposition between the graft material and the aortic wall. Pearson's coefficient was calculated between anatomic variables and the amount of sac regression. Values are expressed as mean ± SD.

Results: After implantation, the endograft was circumferentially apposed to the aortic wall over a mean length of 28±17mm, averaging 5mm more than the aortic neck length. Using standard definition and over 12±5 months of follow-up, 98% of patients exhibited sac regression or stabilization. Sac regression was positively correlated with effective seal length (P=.033) and apposition surface area (P=0.038). Trends toward reduced sac regression in larger aneurysms did not attain statistical significance (P=.075). Sac regression was not associated with aortic neck length, diameter, angulation, or thrombus/calcium composition.

Conclusions: Sac regression during EVAR using the AFX endograft with ActiveSeal appears to correlate with the effective seal length and the surface area of circumferential apposition between the aorta and the graft material. When effective seal length and apposition are considered, traditional anatomic variables are not associated with aneurysm sac outcomes. The ability of ActiveSeal to extend effective seal length beyond the anatomic neck may constitute an additional consideration in planning of EVAR procedures.

Aortic Neck Characteristics Associated with Sac Regression		
Variable	Mean (SD)/ Frequency	P Value
Neck Length	23±16 mm	0.77
Neck Angulation	19±12 degrees	0.64
Neck Diameter	26±5 mm	0.64
Sac Diameter	49±7 mm	0.07
Apposition Length	28±17 mm	<0.05*
Apposition Surface Area	24±14 cm ²	<0.05*
Neck Thrombus	12/41 (29%)	0.57
Neck Calcification	11/41 (27%)	0.62

8:30 am - 8:40 am

25

Endovascular Stent-Graft Repair of Proximal Renal Artery Aneurysms

Venita Chandra, MD , Brant W. Ullery, MD, Jason T. Lee, MD - Stanford University, Stanford, CA

Objective: Despite being rare (<0.7% population), renal artery aneurysms (RAAs) represent the second most common visceral artery aneurysm but have a relatively poorly understood natural history. Open surgery can be extensive and usually involves ex-vivo techniques, particularly since the majority of RAAs are in the distal renal artery or branch points. Endovascular repair of RAAs can be technically challenging depending on the branch point anatomy. We report a case of successful endovascular exclusion of two large adjacent RAAs in a patient which were unusually located in the proximal renal artery.

Methods: A 68-year-old man with vague intermittent abdominal discomfort was found incidentally to have two large proximal RAAs measuring 5.4-cm and 3.9-cm (Figure). The larger, more distal aneurysm was thrombosed, whereas the smaller, more proximal aneurysm came off just distal to the renal ostium and was filling.

Results: The RAAs were successfully excluded after overlapping placement of a 7-mm x 50-mm Viabahn™ covered stent placed in the mid to distal right renal artery from a femoral approach and a subsequent 7-mm x38-mm iCAST™ covered stent protruding slightly into the aortic lumen from a brachial approach. There were no postoperative complications and he has since been maintained on dual antiplatelet therapy. At two year follow-up, he remains asymptomatic and imaging continues to demonstrate exclusion and regression of both RAAs, as well as normal renal arterial perfusion.

Conclusion: Endovascular repair of RAAs via exclusion with covered stents is a safe and effective therapeutic option when such aneurysms are limited to the proximal or mid-portion of the renal artery. A brachial artery approach is often required in such cases due to significant renal artery tortuosity or downward angulation.

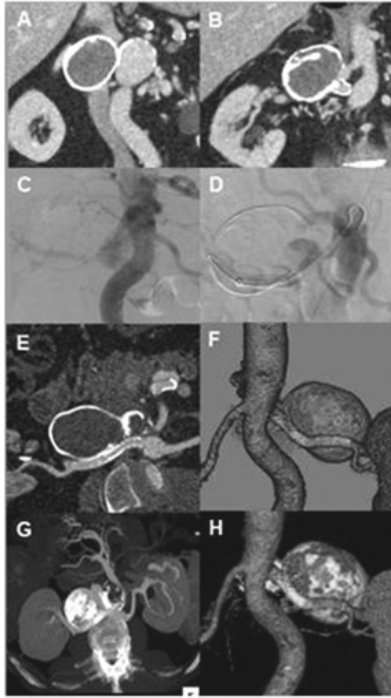


Figure. Preoperative computed tomographic angiography demonstrating two large proximal right renal artery aneurysms (A-B). Angiography following placement of initial covered stent in proximal-mid right renal artery (C). Given persistent filling of the more proximal aneurysm, a brachial approach was used to place a second, more proximal covered stent (D). Postoperative imaging demonstrating successful aneurysm exclusion and absence of endoleak at two-week (E-F), one-year (G), and two year (H) follow-up periods.

8:40 am - 9:00 am

26

Cardiac Stress Testing During Workup for Abdominal Aortic Aneurysm Repair Does Not Improve Patient Outcomes

Benjamin S. Brooke, MD, PhD¹, Yingying Zhang, MS², Tom H. Greene, PhD², Yue Zhang, PhD², Angela Presson, PhD², Larry W. Kraiss, MD¹ -

¹Division of Vascular Surgery, University of Utah School of Medicine, Salt Lake City, UT; ²Division of Epidemiology, University of Utah School of Medicine, Salt Lake City, UT

Discussant: Christian de Virgilio, MD

Objective: Cardiac stress testing (CST) is commonly used to help determine whether patients with abdominal aortic aneurysms (AAA) are candidates for open (oAAA) vs. endovascular repair (EVAR), although it is unknown whether CST achieves its goal of optimizing patient selection and postoperative outcomes. This study examined whether utilization of CST improves adverse cardiac events and survival following AAA repair.

Methods: We identified 3,635 patients in the Vascular Quality Initiative (VQI) database (2010- 2012) with an AAA \geq 5.0-cm who were candidates for oAAA or EVAR. The VSG Cardiac Risk Index was used to stratify patient risk. We then applied generalized estimating equations with inverse probability weighting to adjust for patient factors and hospital level CST utilization to evaluate the effect of CST on 30-day major adverse cardiac events (MACE) and mortality following AAA repair. Analyses were restricted to hospitals with 20% to 80% CST utilization to facilitate adjustment of the utilization rate.

Results: CST was utilized in 1627 (45%) patients during AAA workup, including 451 of 794 (57%) patients selected for oAAA and 1176 of 2841 (41%) patients selected for EVAR. After inverse probability weighting, the use of CST was not associated with the proportion of patients receiving oAAA vs. EVAR (OR: 1.00; 95%CI: 0.77-1.32). As compared to patients without CST during AAA workup, adjusted analyses revealed that CST utilization was not associated with improved outcomes following AAA repair (Table). Among patients receiving CST, an abnormal CST was not significantly associated with selection of oAAA vs. EVAR or with postoperative outcomes after adjustment for the VSG cardiac risk score.

Conclusions: Utilization of CST during workup for AAA repair is not associated with improved postoperative outcomes. Our results suggest that CST adds no value beyond known clinical risk factors when selecting patients for oAAA vs. EVAR or in predicting post-operative cardiac events.

Effect of Preoperative Cardiac Stress Testing on Outcomes Following Open or Endovascular AAA Repair.		
Outcomes (CST versus No CST)	Odds Ratio (95% CI)	P-value
30-Day Myocardial Infarction	1.16 (0.71 - 1.92)	0.55
30-Day MACE	1.15 (0.89 - 1.49)	0.28
30-Day Mortality	0.70 (0.44 - 1.10)	0.12
30-Day MACE or Mortality	1.03 (0.82 - 1.29)	0.82
1-Year Mortality	0.99 (0.69 - 1.41)	0.95

9:00 am - 9:30 am

Coffee Break With Educational Exhibitors

9:30 am - 11:30 am

SCIENTIFIC SESSION VI

Presiding: Peter A. Schneider, MD & Benjamin W. Starnes, MD

9:30 am - 9:50 am

27

Deterministic Effects Following FEVAR are Less Prevalent Than Expected

Melissa L. Kirkwood, MD, Jeffery Guild, PhD, Gary Arbiq, PhD, Carlos Timaran, MD, Jon A. Anderson, PhD, Gregory Modrall, MD, R. James Valentine, MD - Surgery, Division Vascular and Endovascular Surgery, University of Texas Southwestern Medical Center, Dallas, TX

Sponsored by: Fred A. Weaver, MD

Discussant: Brian G. DeRubertis, MD

Objective: Fenestrated endovascular aortic stent grafts (FEVAR) are high radiation dose cases, yet no skin injuries were found retrospectively in our 61 cases with a mean Peak Skin dose (PSD) of 6.8Gy. We hypothesize that skin injury is under reported. This study examined deterministic effects in FEVARs following procedural changes implemented to detect skin injury.

Methods: All procedures with a radiation dose > 5 Gy Reference air kerma (RAK, NCRP threshold for substantial radiation dose level[SRDL]) were included over a 6 month period. Patients were questioned about skin erythema, epilation, and necrosis with a physical exam of the back completed daily until discharge and then 2,4 wks, 3mo. PSD distributions were calculated using custom software employing input data from fluoroscopic machine logs and were validated against gafchromic film measurements using linear regression. Dose was summed for the subset of patients with multiple procedures within 6 mo of the SRDL event, consistent with TJC recommendations.

Results: 22 cases reached a RAK of 5 Gy. The average RAK was 7.6 +/-1.9 Gy (5.1-11.4 Gy), mean PSD of 5.9 +/-1.5 Gy (4.0-8.9 Gy). 55% had multiple endovascular procedures within 6 mo of the SRDL event, mean RAK for this subset was 9.6 +/- 2.4 Gy (5.5-13.4 Gy), mean PSD of 6.2 +/- 2.0 Gy. (4.5-11.0Gy. Gafchromic film measurements were not different from PSD estimations (P<0.001) with a constant of proportionality of 0.99 +/-0.02. One patient died before the first postoperative visit. No radiation skin injuries were found. Putative risk factors for skin injury were evaluated: Smoking(32%), diabetes(14%), cytotoxic drugs (9%) and fair skin type(91%). No other risk factors were present (hyperthyroidism, collagen vascular disorders).

Conclusions: Radiation doses in this study exceeded published thresholds for cutaneous injury, yet no radiation skin injuries were observed. This suggests that deterministic effects are likely less frequent than previously reported and that conventional risk factors for skin injury are poorly understood.

9:50 am - 10:00 am

28

Custom Fenestration Templates for Endovascular Repair of Juxtarenal Aortic Aneurysms

Daniel F. Leotta, PhD¹, Benjamin W. Starnes, MD²
- ¹Applied Physics Laboratory, University of Washington, Seattle, WA; ²University of Washington, Seattle, WA

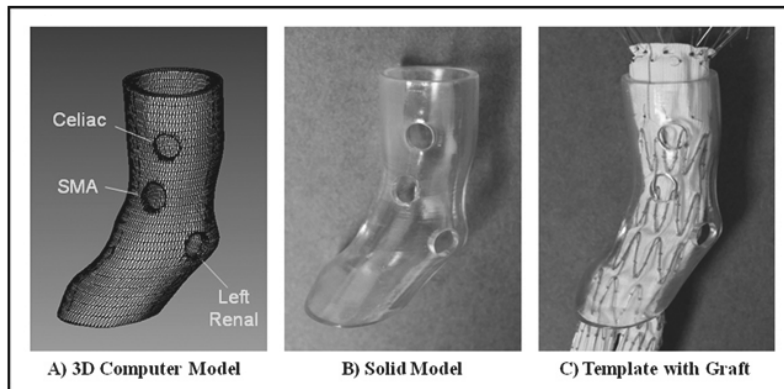
Objective: Physician-Modified Endovascular Grafts, with fenestrations added to accommodate major branch vessels, provide a means for endovascular treatment of Abdominal Aortic Aneurysms (AAAs) that are adjacent to the renal arteries. Manual measurements of vessel origin locations from CT images, however, take time and can lead to errors in the positions of the fenestrations. This is especially true for angulated aortic neck anatomy. To make the fenestration process faster and more accurate, we have developed a procedure to create custom templates that serve as patient-specific guides for graft fenestration.

Methods: We use custom proprietary software to outline the aorta in a patient's CT image dataset and create a 3D computer model of the lumen and the branch vessel origins (Fig 1A). A clear rigid sleeve is then produced with a 3D printer that includes holes at the locations of the branch vessels (Fig 1B). The sleeve is sterilized and slipped over the graft at the time of the operative procedure, and it can be rotated to avoid positioning the holes over stent struts (Fig 1C). The locations of the openings are marked with a sterile pen and the fenestrations are created after removing the sleeve. Our template-based fenestration procedure was validated using an aorta phantom in which we deployed a fenestrated graft. The phantom was created by embedding a commercially-available flexible AAA model in an agar block. The aorta phantom was scanned by CT and a template was designed and printed to match the 4 branch vessels included in the phantom. Fenestrations were created in a standard graft using the custom template, and the alignment of the fenestrations with the branch vessels was evaluated by fluoroscopy.

Results: Continuous fluoroscopy of the aorta phantom showed proper alignment of the graft fenestrations with the 4 branch vessel origins after deployment of the modified graft. The 3D printing method has also been demonstrated by creating templates from clinical CT images of 3 patients with juxtarenal AAAs.

Conclusions: Custom fenestration templates provide for fast and accurate placement of all fenestrations, without the need for manual measurements. Graft fenestration using custom templates will likely save procedural costs and make minimally-invasive aneurysm repair available to more patients with challenging anatomy.

Figure 1. 3D-Printed Template For Graft Fenestration



10:00 am - 10:20 am

29

Risk Factors and Outcomes of Post-Operative Ischemic Colitis in Contemporary Open and Endovascular Abdominal Aortic Aneurysm Repair

Zhobin Moghadamyeghaneh, MD, Michael D. Sgroi, MD, Nii-Kabu Kabutey, MD, Michael J. Stamos, MD, Roy M. Fujitani, MD - University of California, Irvine, Orange, CA

Proposed Discussant: TBD

Objectives: Postoperative ischemic colitis (IC) can be a serious complication following infra-renal abdominal aortic aneurysm (AAA) repair. We sought to identify risk factors and outcomes in patients developing IC following open and endovascular AAA repair (EVAR).

Methods: The NSQIP database was used to examine clinical data of patients undergoing AAA repair from 2011-2012 developing postoperative IC. Multivariate regression analysis was performed to identify risk factors and outcomes.

Results: We evaluated a cohort of 3486 patients underwent AAA repair (11.6% open repair and 88.4% EVAR). The incidence of postoperative IC was 2.2% (5.2% for open repair and 1.8% for EVAR). Surgical treatment was needed in 49.3% of patients. The mortality of patients with IC was higher than patients without IC (AOR: 4.78, P<0.01). Also, need for surgical treatment (AOR: 6.20) and age (AOR: 1.07) were mortality predictors of IC patients. Predictive factors of IC include (P<0.05) female gender (AOR: 2.27), chronic renal failure (CRF) (AOR: 5.75), need for intra/postoperative transfusion (AOR: 5.50), and rupture of the aneurysm before surgery (AOR: 5.38). Open AAA repair was not an independent risk factor of IC (AOR: 1.40, P=0.39) and higher IC rate in open AAA repair compare to EVAR is related to the higher need for transfusion in open AAA repair (AOR: 10.67). Also, in open AAA repair suprarenal clamping of the aorta (AOR: 2.76) was a predictor of IC. Sub-analysis of the data in both groups reported in Table1, 2.

Conclusion: Although the frequency of IC in open AAA repair was nearly three times greater than in EVAR, open surgery is not an independent predictor of IC. Rupture of the aneurysm before surgery, suprarenal clamping of the aorta, need for transfusion, and CRF are postoperative IC predictors. AAA patients who develop IC have a nearly fivefold higher mortality compared to those without IC. Surgical treatment is needed in nearly 50% of IC patients and it is a mortality predictor.

Risk factors	Adjusted Odds Ratio	P Value	95% Confidence Interval
Female Gender vs. Male Gender	3.07	0.025	1.15-8.18
Suprarenal Clamping vs. Infra-renal Clamping	2.67	0.046	1.02-7.02
Ruptured Aneurysm vs. Non-Ruptured Aneurysm	3.96	0.08	1.43-10.97
Operation Time	1.001	0.64	0.9-1.00
Chronic Renal Failure Vs. No Comorbidity	5.49	0.17	0.48-62.66
Age	0.99	0.79	0.99-1.005
Need for Intra/Postoperative Transfusion	2.06	0.35	0.44-9.58

Risk factors	Adjusted Odds Ratio	P Value	95% Confidence Interval
Ruptured Aneurysm vs. Non-Ruptured Aneurysm	7.61	P<0.001	2.44-23.66
Need for Intra/Postoperative Transfusion	6.91	0.006	1.76-27.09
Female Gender vs. Male Gender	1.56	0.43	0.50-4.86
Operation Time	1.001	0.85	0.99-1.006
Chronic Renal Failure Vs. No Comorbidity	5.14	0.07	0.84-31.28
Age	1.01	0.73	0.95-1.06

10:20 am - 10:40 am

30

The Use of Micro-Oxygen Sensors (MOXYs) to Determine Dynamic Relative Oxygen Indices in the Foot of Patients with Critical Limb Ischemia (CLI) During an Endovascular

Therapy: The First-In-Man ‘Si Se Puede’ Study
Miguel Montero-Baker, MD¹, Luis Morelli-Alvarez, MD¹, Kristen Helton, PhD², Kit Yee Au-Yeung, PhD² - ¹San Juan de Dios Hospital, Costa Rica, Costa Rica; ²PROFUSA, Inc., South San Francisco, CA

Sponsored by: Joseph L. Mills, MD

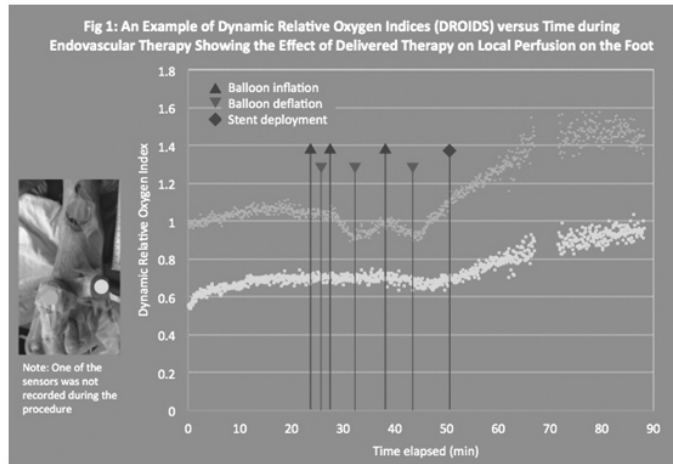
Discussant: Dennis F. Bandyk, MD

Objective: CLI patients exhibit uneven patterns of perfusion in the foot, which makes it challenging to determine adequate topographical needs by angiography alone. This study assessed the feasibility of reporting dynamic relative oxygen indices (DROIDS) from multiple locations on the foot during endovascular therapy, using a novel micro-oxygen sensor (MOXYs) approach.

Methods: A prospective, 28-day, single arm, observational study was performed on 10 patients who underwent endovascular therapy for CLI. At least 24 hours prior to therapy, 4 MOXYs were injected in each patient (1 in the arm, 3 in the treated foot). The optical signal from the MOXYs corresponds to relative oxygen concentration. Using a custom detector on the surface of the skin, the sensors were continuously and non-invasively measured. The ability to locate and read the signal from each injected MOXY was characterized. Oxygen data from the MOXYs were collected throughout the revascularization procedure; the timing of therapy deployment was recorded during the procedure to assess its relationship with the oxygen data from the MOXYs. Moreover, oxygen data collection and clinical evaluation were performed immediately post-op, as well as post-op days 7, 14, 21, and 28. The study protocol was approved by the CEATE Research Foundation IRB of Costa Rica; informed consent was obtained from patients prior to study procedures.

Results: Ten CLI patients were enrolled (30% Class 4, 70% Class 5), 50% were male, and the mean age was 70.7 (range: 46-90). All patients were Hispanic of varying origin (European and indigenous origins). MOXYs were successfully read 209/212 times (98.6%) in all patients over the course of the study. Sensors were compatible with intra-operative use in the cath lab and post-operative use in an office setting. In 9/10 revascularization procedures, at least one of the three MOXYs showed immediate change in DROIDS, correlating to deployed therapy (Fig 1). There were no adverse events related to the microsensor materials.

Conclusions: The study results show that use of MOXYs in CLI merits further testing to determine its potential impact on clinical decision making that ultimately can lead to improved healing and limb salvage rates.



10:40 am - 11:00 am

31

More Aggressive Anticoagulation/Anti-Platelet Regimen Improves Patency Following Viabahn Stent-grafting of the SFA

Brant W. Ullery, MD, Nathan Itoga, MD, Kenneth Tran, Ronald L. Dalman, MD, Jason T. Lee, MD - Stanford University, Stanford, CA

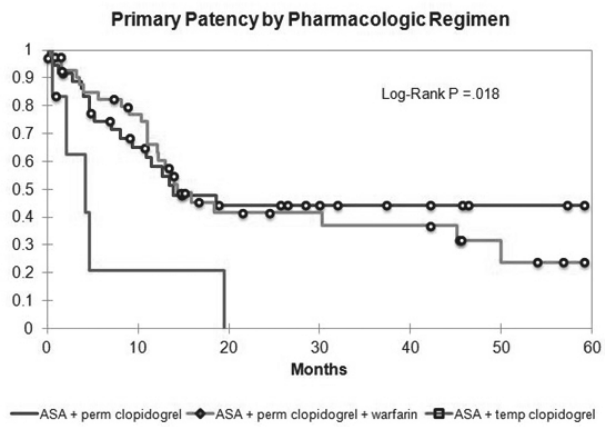
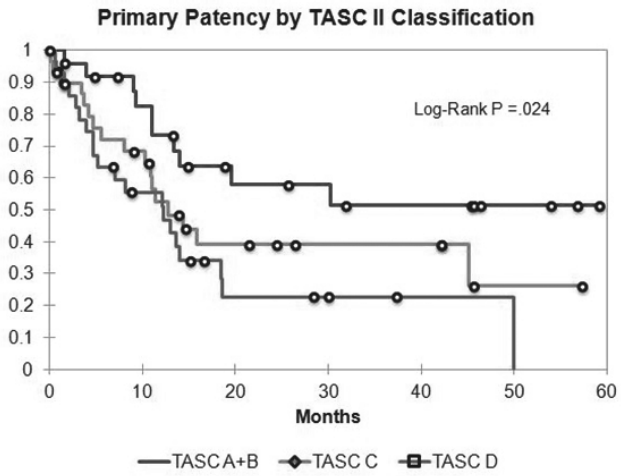
Discussant: TBD

Objective: Covered stents are increasingly used to treat femoropopliteal occlusive disease. We aimed to determine which clinical variables and post-procedural pharmacologic regimen provided optimal long-term graft patency.

Methods: Clinical and angiographic data for consecutive patients from 2006-2012 undergoing superficial femoral artery (SFA) stenting with Viabahn covered-stent grafts were reviewed. Graft patency was defined as uninterrupted freedom from restenosis or occlusion and was determined by Kaplan-Meier analysis. The influence of relevant clinical variables on patency was determined via univariate and multivariate analyses.

Results: Viabahn stent-grafts were placed in a total of 85 limbs in 65 patients (65% male, mean age, 70 years). Indication for treatment included claudication (n=54) or critical limb ischemia (n=31), with the majority classified as TASC II C (n=30) or D (n=30) lesions. Mean follow-up was 34 months (range, 12-80). Post-procedural pharmacologic regimens included aspirin (ASA), clopidogrel, and warfarin (49%), ASA and permanent clopidogrel (44%), or ASA and temporary clopidogrel (7%). Primary patency rates at 1-, 2-, and 3-years were 49%, 25%, and 17%, respectively. Secondary patency rates at 1-, 2-, and 3-years were 69%, 43%, and 31%, respectively. Multivariate analysis identified use of 5-mm stents (HR 1.56) as an independent risk factor for loss of patency. Kaplan-Meier analysis demonstrated significantly shorter mean primary patency among TASC D lesions (17.9 months vs. TASC C, 22.4 months vs. TASC A+B, 35.8 months; P=.02) and those taking ASA + temporary clopidogrel (6.4 months vs. ASA + permanent clopidogrel, 24.9 months vs. ASA + clopidogrel + warfarin, 26.9 months; P=.018) (Figures). Eighty-three percent of patients discontinuing clopidogrel within three months of procedure exhibited loss of primary patency.

Conclusion: Smaller stent size (<6 mm) independently predicted loss of primary patency. Improved primary patency rates were noted with non-TASC D lesions and aggressive antiplatelet/anticoagulation regimens. Patients undergoing SFA stent-grafting for occlusive disease should receive ≥ 6mm diameter stents and be maintained on clopidogrel for a minimum of 6 months post-procedure, and potentially lifelong if tolerated.



11:00 am - 11:20 am

32

A Multiregional Vascular Registry Experience: Optimization of Data Capture for Longitudinal Outcomes Surveillance Using an Electronic Medical Record

Tazo Inui, MD¹, Robert J. Hye, MD¹, Faith F. Anthony, MA², Mary-Lou Kiley, MBA LCSW², Robert W. Chang, MD³, Thomas F. Rehring, MD⁴, Nicolas A. Nelken, MD⁵, Bradley B. Hill, MD⁶ -
¹Surgery, Kaiser Permanente, San Diego, CA; ²Kaiser Permanente, San Diego, CA; ³Kaiser Permanente, San Francisco, CA; ⁴Kaiser Permanente, Denver, CO; ⁵Kaiser Permanente, Honolulu, HI; ⁶Kaiser Permanente, Santa Clara, CA

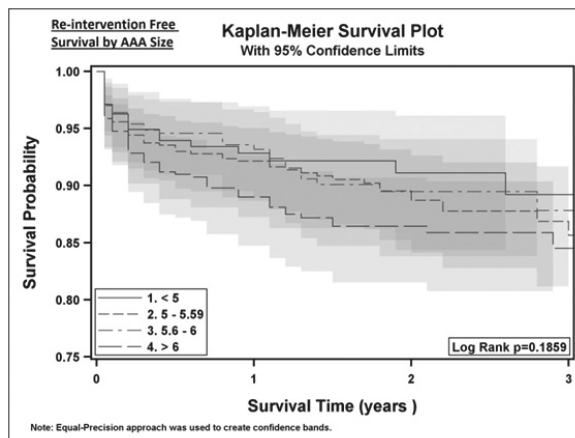
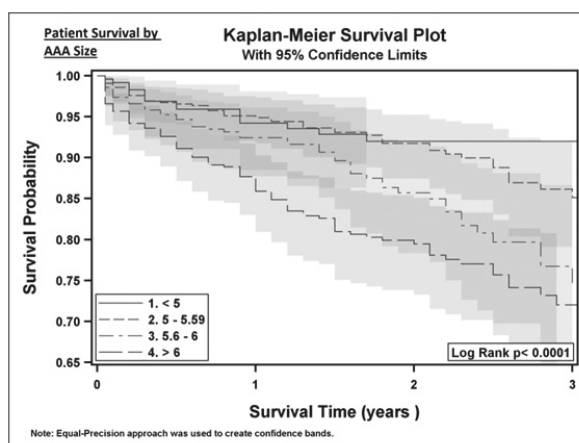
Discussant: Fred A. Weaver, MD

Objective: Registries are proven useful to assess clinical outcomes but data entry and personnel expenses are a challenge. We developed a registry to track patients undergoing Endovascular Aortic Aneurysm Repair (EVAR) in an integrated healthcare system leveraging an EMR to evaluate clinical practices, device performance, surgical complications, and long-term outcomes. This study describes the registry design, data collection, outcomes validation and on-going surveillance, highlighting the unique integration with the EMR.

Methods: EVARs in 5 geographical regions of a large U.S. health plan were entered in the registry. Cases were imported using a screening algorithm of inpatient codes applied to the EMR. Standard note templates containing discrete data fields were utilized to enter pre-, post- and operative data as part of normal work flow. Patient co-morbidities, aneurysm characteristics, implant details, and surgical outcomes were captured. Patients are followed for life and all relevant events captured.

Results: Between 1/2010 and 6/2013, 2112 patients were entered in the registry. Mean aneurysm size was 5.9 cm (SD 1.3). Most patients were male (84%), hypertensive (69%), or had a smoking history (79%). Overall re-intervention rate was 10.8%: conversion to open repair (0.9%), EVAR revision (2.6%), other (7.3%). 27% of re-interventions were for endoleaks, (I: 34.3%, II: 56.9%, III: 8.8%, IV and V: 0.0%) and 10.5% were due to graft malfunction. Re-intervention due to infection (3.4%) or rupture (2.3%) was infrequent. Three year survival in the cohort was 88.2%. Kaplan-Meier curves of survival and re-intervention free survival by aneurysm size are shown.

Conclusions: Leveraging of an EMR provides a robust platform for monitoring short and long-term outcomes after AAA repair. Use of standardized templates in the EMR allows data entry as part of normal work flow, improving compliance, accuracy, and data capture using limited, but informed personnel. Assessment of patient demographics, device performance, practice variation and post-operative outcomes benefits clinical decision making by providing complete and adjudicated event reporting. Longitudinal findings from this large, community-based EVAR registry augment other studies limited to perioperative complications or small patient cohorts.



11:20 am - 11:30 am

33

A Randomized Comparison of Specialized Versus Standard Compression After Saphenous Vein Ablation

Mark Meissner, MD¹, Kathy Gibson, MD² -
¹Surgery, University of Washington School of
Medicine, Seattle, WA; ²Lake Washington Vascular
Surgeons, Bellevue, WA

Objective: Endovenous thermal ablation techniques have largely replaced traditional surgical procedures for the treatment of varicose veins and compression therapy is often regarded as an important adjunct to these techniques. However, little is known regarding the effectiveness of different types of postoperative compression. The purpose of this study was to compare post-ablation outcomes with the use of a standard versus a specialized postoperative compression stocking.

Methods: Consecutive patients undergoing radiofrequency or laser ablation of the great saphenous vein (≤ 5 concomitant phlebectomies) were randomized to postoperative compression with either a standard 20 - 30 mmHg compression stocking (n = 9) or a thigh-high footless stocking with an adjuvant thigh sleeve (specialized stockings, n = 11) worn continuously for 72 hours and during the day for an additional 4 days.

Results: Enrolled patients were predominantly female (75%) and were well matched with respect to sex and modified venous clinical severity score (VCSS without stocking subscore). Patients randomized to specialized stockings were older (53.3 ± 14.4 versus 41.3 ± 10.2 yrs, $p=.05$) Complete saphenous vein occlusion at 28 days was observed in 78% of those in the standard stocking group in comparison to 90% in the specialized stocking group ($p = .5$). Visual analog pain scores were lower at 7 days (2.4 ± 2.7 versus 5.1 ± 3.1 , $p=.05$) and modified VCSS scores lower at 28 days (0 ± 0 versus 0.9 ± 1.1 , $p=.02$) in the specialized compression group in comparison to the standard group. Patients in the specialized stocking group also resumed standing, walking and sporting activities more quickly, although return to work, most household chores, and social activities were equivalent.

Conclusions: Although endovenous thermal ablation has become well established in the management of varicose veins, the adjunctive role of post-operative compression remains unclear. This study suggests that specifically designed post-operative stockings may have benefits with respect to post-operative pain, clinical outcome, and return to vigorous activities.

11:30 am

Meeting Adjourns

§ = Best Trainee Paper Award

90

NOTES

NOTES

NOTES

NOTES

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 three (3) 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